

# **The Notion of Cause in Anaximander**

**Thesis for the degree of Master in Philosophy**

**Atle Sperre Hermansen**

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## **i: Abbreviations**

KRS Kirk, Raven, Schofield, 2004. *The Presocratic Philosophers*, 2<sup>nd</sup> Ed, Cambridge, Cambridge University Press.

The entry KRS followed by a number (KRS 100) refers to paragraph in KRS. The entry KRS (2004:100) refers to page number.

DK Diels, Kranz, 1954. *Die Fragmente der Vorsokratiker*, Berlin, Weidmannsche Verlagsbuchhandlung.

References to DK will as per standard refer to individual philosophers by Diels' numbering, then to fragments of type A, testimonia, or type B, extant fragments (DK12 B1).

LS Lidell & Scott, 2002. *Greek-English Lexicon*, Oxford, Oxford University Press.

## **ii: Introduction: the theme**

The theme of this here essay is the notion of 'cause' as it is expressed by the fragments on the Presocratic philosopher Anaximander of Miletus (ca. 610 – ca. 546).

I wish to argue that the idea of natural events implicitly having causes *as a universal rule* springs from none other than Anaximander. I also wish to argue that to Anaximander the world is governed by blind mechanism, without any final cause or cosmic supernatural principles, and finally, that to Anaximander causation (though not expressed as such) must be essential and primary in the objects of the world. In order to do so, I will begin with a discussion on the historical placement of Anaximander and the evolution of the notion of cause (part 2, *The notions of aitia*), where the question is stated as of where, between the *aitia* of 'personal guilt' and the *aitia* of 'universal rule', is Anaximander situated? I hope to show that he is far to the latter than often claimed. Then I will evaluate the fragments on him and discuss several interpretations of these (part 3.2; 3.3; 3.4), in order to explicate the pattern of causal explanations in Anaximander that will witness his implicit causal structure. Finally I will argue my analysis of the causation implicated by the interpretation of Anaximander (part 3.5, *Causation in On nature*).

How, one might ask, can one expect to find anything remotely reminiscent of a causal analysis in Anaximander, an early philosopher (it that, at all) that never said anything about causation as such, let alone used the Greek word for ‘cause’, *aitia*, one single time? Even successfully discovery of claims about particular cosmological happenings, or statements about change in ontological or physical state in generalized form, would be a long way from making a true finding as to what Anaximander said that causation really was, or what the causal relata were, or the mechanics of causal connection as such.

*Prima facie*, when Anaximander speaks of natural events he (probably) says that they happen by necessity, given the physical state of the world. Rather than implying causal notions, this implies that Anaximander had the same uncomplicated view on causality that his contemporaries had: he simply did not have one.

So how do I go from there to showing that Anaximander really had a view on causation, that he actually had some opinion on whether causality was this or that, whether it held by necessity or something else that is not necessity (regularity, chance, luck, or whatever), that some things (or event, or facts, or propositional items or whatever) were the relata of causal relations and thus cause other things (repeat last parentheses), or in fact any statement about the nature of causation whatsoever?

Though the word ‘cause’ often will remain unmentioned in the sources on the Presocratics, both in testimonia and extant fragments, I hold that references to the phenomenon of causation is still highly present in these texts. The notion of cause is intimately intermingled with the notion of explanation, and explanation of natural phenomena is what “the natural investigators”, as Aristotle called them, devote themselves to. The fact that they do not use the exact term for ‘cause’, αἰτία, does not mean that they do not make statements about causal connection.

As the Presocratics famously attempted to give causal explanations of physical, natural phenomena, they implicitly applied and developed causal notions. They should, then, be available for examination and / or explication. These physical causal explanations were furthermore of a complex nature – if we today are not impressed by their allegedly complexity, it would do well to compare them to their contemporary alternative causal explanations; “Zeus did it” or “the Oracle said it would happen”. In those mythical stories causation works from gods to nature and is not just accessible to divine intervention, in one way, causation *is* divine intervention. Of course causation was not exclusively the domain of gods; humans and animals too were capable of having responsibility. But the rule of the

natural world (in which humans and polis existed matter-of-factly) belonged to the gods; any responsibility of happenings could be passed on to the gods.

Connected with the concern with providing explanation is the second-order concern with the nature of explanation itself, says Hankinson (1998:5), and this concern is evident beneath the surface of methodological questions even when these questions are not directly broached, as they are before Plato. Through these causal explanations and second-order questions I argue that the notion of cause is shining a dim light.

## 1. Presocratic explanations

The Presocratic explanations of cosmology and cosmogony can be subsumed under a general discussion on whether the cosmos was self-sufficient, i.e. the laws of nature (but not necessarily expressed in these words, i.e. not as *laws*) were sufficient for explaining the workings of the universe; or if there was need for something else, something more than the observables of nature, be that a directing force, a mind, or god-being, or in some way a *will* behind it all.

First, the reasons why the cosmos could be said to be *insufficient*: (i) the laws of nature explain only certain features of the universe, (ii) a need for an external source (*a*) at the generation of cosmos, (*b*) overall, (*c*) to give a goal, an end, a purpose; (iii) the laws do not hold, nature needs further support or explanation; (iv) the laws hold, but do not explain all; (v) there are no laws, an indeterministic cosmos.

The reasons or explanations one could give for calling the cosmos *sufficient* are many, possibly innumerable so; the following I believe summarizes to a certain extent the Presocratic views: (i) the laws are sufficient to explain everything; (ii) no need for external forces, justifiers *et al*; (iii) the laws are necessary and hold; (iv) the laws are unnecessary but hold; (v) the cosmos has no goal; (vi) the goal of the cosmos comes from an internal source, or the cosmos as a whole; (vii) the world is not generated, it is eternal; (viii) the world is mechanistically generated, the generation is internal for the universe or reality.

In modern terms, I think, we would describe the discussion as one questioning with what force, if any, the laws of nature hold, and whether those laws somehow make the universe self-sufficient. This is of course tightly connected to the notion of causation and whether there really is a “special realm” of causality in nature, such that one event is somehow responsible

for the generation of another and that the cause causes the effect out of necessity. In other words the question of a self-sufficient universe reads as a gateway to the metaphysics of causation.

The Presocratic philosophers generally gave naturalistic explanations of phenomena in nature by identifying one or more physical causes for the phenomena, consciously abandoning references to gods or other anthropomorphic supernatural forces. From their writings and the doxographical<sup>1</sup> tradition we also see that a great deal of their explanations concerned marvellous phenomena like lightning and thunder, earthquakes, and eclipses; phenomena that in Lloyd's words (1987:32) "where either terrifying or rare or both and that had often, in mythology, been associated with gods". It is possible that these phenomena were chosen as subjects for explanation because of their striking (in some cases, literally) nature, which made their explanation in itself seem pertinent, but also in order to expand cosmological knowledge. It is also possible that some philosophers wanted to challenge contemporary and traditional religious-mythological beliefs by targeting exactly the phenomena that tradition made claims to explain. But this is merely conjecture<sup>2</sup>. As Kahn points out (1994:108), in traditional Greek religion Zeus was the king and father of all gods, but his special domain was the weather. He was "god of the sky, master of the weather, gatherer of rain clouds on mountain peaks, whose sign to men is the lightning flash and whose voice a peal of thunder". When Zeus was angered, he hurled thunderbolts down on the humans. A naturalistic account of meteorological events and marvellous phenomena like thunderbolts could easily be interpreted as an open attack on the traditional conception of the gods. As Kahn puts it: "Nothing symbolizes better the overthrow of Zeus than does a rational description of the thunderbolt" (Kahn, *ibid*).

A certain reservation must here be noted; for it could also be that it is our doxographical sources that have taken a special interest in explanations of marvellous

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<sup>1</sup> From the word 'doxa', meaning 'opinion', a phrase coined by Diels. This tradition is the collection of sayings that rightly or wrongly has been attributed the Presocratic philosophers by ancient and medieval historians of philosophy. See chapter 3.1 *Sources* in this essay.

<sup>2</sup> Possible support for this conjecture is Algra's (1999:49) argument that philosophical cosmologies were unfettered by religious and political consideration, unlike traditional cosmologies, which often took the form of theogonies. This gave the philosophical or pre-scientific explanations freedom and possibility to challenge traditions and explanatory hegemonies concerning the universe and its beginnings: "No such connections to tradition and ritual are attested (nor are they plausible) for the early Ionian cosmologist. They appear to have indulged in theoretical activity for its own sake, they felt free to speculate, and as we shall see, they had no scruples about devising theories that were in crucial respects radically different from those of their predecessors". Other support is Lloyd's (1987:36): "[the inquiry into nature] often was conducted by men who did not make use of, and may have intended directly to supplant, traditional beliefs in divine interventions in natural phenomena..." and continued (1987: 36 n 128): "This may be thought likely in the case of Democritus, in particular, if he saw belief in the gods as in part a mistaken inference from terrifying natural phenomena", which he did according to Sextus *M.* IX 24 = DK68 A75.

phenomena, and failed to report on the Presocratic explanations of more mundane happenings. Given our relationship to the original writings of the Presocratics, there is no manner for us to tell. Nevertheless the Presocratic Milesians did construct (sometimes) elaborate explanations of marvellous phenomena, possibly at the expense of less striking natural phenomena, undeniably giving testament of a serious and methodical interest in unusual but periodic phenomena.

This rational analysis of marvellous phenomena I believe reflects a wondering about not only why e.g. lightning happens when it happens, but also why it does not happen. What special circumstances is it that takes place when lightning strikes? What is the significant difference between occasions that produce lightning and occasions that do not? If the sun can be eclipsed at one point, why not on any other point, why, in fact, does the sun shine at all if it does not have to? As Lloyd (1987:51) states it: “The explicit expression of a universalised concept of nature involves a corresponding development of clarification in the notion of marvels or miracles: the category of the ‘supernatural’ develops, in fact, *pari passu* with that of the ‘natural’”. Hence marvellous phenomena cannot warrant special attention as *infrequent* phenomena without mundane phenomena having status as *frequent* phenomena; i.e. regular and governed by natural law.

An ancient philosopher that advocates the need for a directing mind or will ‘behind’ or ‘before’ the universe, for instance Plato with the Demiurge of his *Timaeus*<sup>3</sup>, by this makes a statement to the effect that the universe is insufficient.

On the opposite end of the schema; a philosopher who abandons the idea of a divine creator of the universe by this makes the claim that the universe is self-sufficient, that it can generate itself, and that it either has no goal or that the goal is somehow built into the workings of the universe. These theories are the opposite of teleological theories and usually mechanistic in content. The atomists Democritus and Epicurus are paradigm examples of philosophers of nature without a teleological universe, a universe that is self-sufficient.

It is my intention to show that as Anaximander did not postulate any mind or will or divinity behind his universe, and that he in fact postulated sufficient natural laws, thus making his universe a self-sufficient one.

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<sup>3</sup> Which is a case of ‘before’, cf. Hankinson (1998:118).



## 2: The notions of αἰτία

“Now the origins of the idea that *all* natural phenomena are law-like are, fairly evidently, to be sought not in the medical writer themselves, so much as in the Presocratic philosophers, particularly in the group whom Aristotle calls the φυσιολόγοι, ‘the enquirers into nature’. That some such general principle had been explicitly formulated by the time we come to the end of the Presocratic period can be affirmed on the basis of Leucippus Fr. 2<sup>4</sup>, which states that ‘Nothing comes to be at random, but everything for a reason and by necessity’. The question is, rather, how much earlier a similar principle was expressed or at least used...” (Lloyd 1987:32)

Thus our mission in this chapter is stated by Lloyd’s final question. When was the principle that ‘all things have causes’ first in use? Let us from the start notice that Lloyd equates ‘the idea that all natural phenomena are law-like’ with the statement to the effect that everything has a cause. We bear this in mind. Lloyd after the above citation quickly investigates the naturalistic theories of Thales, Anaximander and Anaximenes, finds a promising start there, but then concludes that no such statement on generality of causes is to be found in our extant evidence for the Milesians (1987:33).

Later, Lloyd shows that while “the idea of nature as implying a universal nexus of cause and effect” came to be made *explicit* in the development of Presocratic philosophy, “an assumption of the regularity of natural phenomena is implicit in much of human behaviour” (1987:49). The notion of φύσις, i.e. the idea of nature as regularities, builds directly upon ordinary experience of the regularities of nature. Closely related to this notion is the notion of ‘cause’, i.e. the explanations of not just *why*, but also *how* natural events occur. Given that causal explanations of *some* kind are historically impossible to map, (given the assumption of regularity in much of human behaviour), the deliberate investigation of how particular kinds of natural phenomenon occur only begins with the philosophers, Lloyd argues (1987:52-53). But here our evidence of Presocratic philosophy is too thin, and we have to search elsewhere for documentation of the development of causation as such; namely the historians and in the Hippocratic Corpus.

I have no argument with the proposition that the *how*’s of regular and natural phenomena are systematically developed in history and medicine foremost, and only secondly in philosophy – though Lloyd gives philosophy (by her representative Leucippus) the honour of explicating the universality of causation. Where I disagree with Lloyd is his claim that no statement on generality of causes is to be found in the evidence of the Milesians. Indeed, I argue that some such statement is in use by the second of the great Milesians, Anaximander, and that he’s writing indicates a clear idea of causation.

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<sup>4</sup> DK67 B1

In arguing this position, I need to start elsewhere, with the original notion of ‘cause’.

## 2.1 Original *aitia*

The Greek term for ‘cause’, αἰτία, has a range of significance much wider than our term ‘cause’ has as the latter is used commonly and philosophically in contemporary discussion. Αἰτία correspond to something like ‘the responsible factor’ in our terminology. LS present the following definition of αἰτία: *responsibility, guilt, blame, accusation*<sup>5</sup>; II: *cause*; III: *occasion, motive*; IV: *head, category*; V: *case in dispute*. Only the second of the meanings listed for αἰτία is familiar to us through our use of the term ‘cause’, and it is this specific sense of αἰτία that has been passed down to us through the terminological development over time. The term, as seen in the above definition, has its origins in the notion of ‘guilt’. Lloyd (1987) writes: “In the context of the development of Greek views on causation, it has long been recognised that much of the terminology, and some of the key ideas, originate in the human sphere<sup>6</sup>. Of the words that came to be applied to causation in general, αἰτία and the cognate adjective αἰτιος are originally used primarily in the sphere of personal agency, where αἰτία may mean ‘blame’ or ‘guilt’” (1987:52).

The term has its source in the adjective *aitios* meaning ‘responsible’ or ‘blameworthy’, giving the nouns *aition* and *aitia*, meaning ‘cause’ or ‘reason’. Hankinson (1998) writes “their initial connotation of intentional agency is gradually eroded as the term becomes established in a semi-technical vocabulary of causation.” (1998:73). There is no disagreement as to what the terms mean; Vegetti (1999) speaks of moral, political, and judicial language of culpability, responsibility and imputability of facts and actions; Hankinson (1998) names the original notion as *intentional* agency.

How does this term of *aitia*, then, relate to our modern term of ‘cause’? The notion of cause in modern English has connotations of activity; a cause is something which does something. This connotation is not present in the original notion of cause, it is one of responsibility, which is a broader concept than causation<sup>7</sup>.

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<sup>5</sup> Pearson (1952:205-206): “*Aitia* has the active meaning of ‘accusation’ ‘complaint’ ‘grievance’ and the corresponding passive meaning ‘guilt’ ‘blame’ ‘responsibility’; and by logical development it also means ‘that which is responsible’ – the ‘cause’ (...) There is often some doubt whether a Greek writer is thinking in terms of ‘cause’ or ‘accusation’ or ‘guilt’. But the adjective *aitios* is always passive in meaning, denoting the person or thing held responsible. Hence the neuter *to aition* is quite naturally used in the sense of “cause” and is in fact less ambiguous than *aitia*”.

<sup>6</sup> Also Kahn (1994:193): “Language is older than science; and the new wine must be served in whatever bottles are on hand”. By this he refers to how phrases from the mundane and concrete human life became abstracted and generalized in order to apply to natural events and universal processes.

<sup>7</sup> cf. Hankinson (1997:85-86)

This indicates that the term *aitia* has undergone some sort of development during the history of its use, which is quite correct. And so we ask the question how did this wide term of ‘guilt’ and ‘personal responsibility’ develop into the modern notion of abstract, generalised, “neutralized” ‘cause’?

## 2.2 Development of causation

Vegetti (1999) argues that fifth-century thought was largely lacking in any explicit theoretical reflection on the problem of causality and the ‘strict’ conception (‘cause’ as ‘the efficient cause’) of causal connections. But it did conceive of relationships between things and events that later theory would have included in the general context of causality (1999:272). These relationships came to be described in terms that are different from the language of causality that we today employ. Phenomena were said to occur ‘by nature’ (*physei*) which, as we have seen in Lloyd, depend on the regularity of the world’s natural order. The dependency is often described as ‘necessity’ (*ananke*), a necessity which sometimes is connected not to regularity but to decrees of destiny and divinity. Necessary dependence of events on the plan of destiny occurs frequently in Herodotus with the expression ‘it had to happen’ (*eidei*). If the regularity on which the events depend are not divine or natural, but human, the connection is often expressed with the weaker term probable, plausible, likely (*eikos*). Only by applying our later patterns of thought can the connection and dependence between things and these different concepts be brought within the context of causality (1999:272). There were, as we see, no lack of notions under which to categorize that which we later have come to reductively categorize under the notion of cause.

Once systematic reflection on the notion of cause developed, it did not follow that the notion of an efficient cause or otherwise ‘Humean’ (by this not referring to regularity analysis of causation) causation was developed<sup>8</sup>. Both Plato in the *Phaedo* and Aristotle in *Physics* and *Metaphysics* reflect, discuss and conceptualize on causation without them claiming that modern notion of an effective cause. Plato famously counts Ideas as causes, and defines an *aition* quite generally as ‘that because of which something comes to be’ (in *Cratylus* 413a); and that definition covers both efficient and teleological explanation. An *aitia*, then, can be anything which is referred to as being in some way explanatory of something. Plato (in the

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<sup>8</sup> Vegetti (1999:271); (Hankinson 1998:5): We must “distinguish between an analysis of causal language as it is actually employed, and self-conscious theories of cause and explanation”.

*Phaedo*) does not reject ordinary causal accounts out of hand; “rather he considers them deficient: mechanistic accounts can (perhaps) explain how things work, but they cannot give any account of why they do so” (Hankinson 1998:87). Aristotle says that the αἰτίαι are the “because of which”; his four causes are four “because” (Aristotle *Physics* II.8.198a14ff). Of these four αἰτίαι only one *prima facie* corresponds to our use of the term, namely Aristotle’s efficient cause. The other three are the formal cause; the material cause; and the final cause i.e. teleological causation. But, as it seems, the efficient cause does not resemble our modern notion of efficient cause, either: “For Aristotle (...) will tell that it is not the sculptor working on his sculpture who is the moving cause, but the art of sculpture” (Frede 1987:126).

The reason we would not call Plato’s or Aristotle’s causes for ‘causes’ in the modern sense (for ends or forms or ideas do not seem to be those kinds of things proper to name as causes), is that they are *entities*, “whereas causes, one might think, are events, facts, things one does, in short *propositional items*”, Frede (1987:128) argues<sup>9</sup>. Throughout antiquity it is non-propositional items, entities, like Aristotle’s causes which are referred to when causes are discussed systematically<sup>10</sup>. The later tradition quite definitely treats Aristotelian causes as non-propositional. Similarly, Epicurus treats causes as non-propositional when he regards the atoms and the void as the ultimate causes of everything. And it is certainly true of the Stoics who require a cause to be a body; Frede continues (1987:129).

Frede argues that it was the Stoics insistence that only ‘active causation’ was causation proper, thus making it so that causes no longer were seen as entities, but rather as propositional items. So much on the active nature of causation, then. But when, as we originally stated the question, did the notion of causation as such first appear?

In order to answer that, we must first establish what the notion of causation as such, *causation proper*, is. Following the language and definitions employed by Vegetti (1999), he defines causation proper as causation expressed in a generalized, abstract, “neutralized” concept (1999:274), as universal and necessary (1999:273); by explicitly theoretical reflection

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<sup>9</sup> Here it could seem natural to object and argue that the ends and forms of Aristotle are not *entities*, as entities usually describe things or objects in the world. Ends or forms seem more like abstracted phenomena that only show up in language (though for Aristotle they showed up in nature, as well). However, if we think about ‘modern’ causes as *happenings*, we see that the ancient causes must be something that are not happenings, i.e. something still, object-like.

<sup>10</sup> Sometimes philosophers when they state the cause of something refer to propositional items (‘the cause of this is that...’). In this they just follow a shift in ordinary language towards the notion of an active cause and thus a propositional item. Aristotle sometimes even refers to propositional items when he gives examples of his kinds of causes. But in other passages it is clear that when he distinguishes kinds of causes he has entities, non-propositional items in mind (Frede 1987:129).

(1999:285); sometimes as necessary and sufficient (1999:272); and not in the personal language of culpability and responsibility (1999:274).

To Lloyd (1987), it is regularity in nature, that “nature is implying a universal nexus of cause and effect”; the existence of natural causal for all phenomena; and the *how* and to a lesser degree *why* of natural phenomena.

Frede (1987) eloquently defines causation proper thus: For everything we can ask ‘What is its *aition*?’ For everything there is something which plays to it a role analogous to that which the person responsible plays with reference to what has gone wrong (...) with reference to everything, something by doing something is responsible for it. (1987:132). Though the writing of Frede in this context is mainly about the Stoics, how he defines causation proper has been adopted also by Vegetti (1999). For our purposes, we shall just have to overlook the ‘something *by doing* something’ as that defines causation as efficient causation, hence not applicable to the causal analysis of importance here.

Lloyd, as we have seen, claims that while philosophy explicated generalized causation as such, there was a significant development of causal thinking within history and medicine. Vegetti targets amongst others Lloyd for their belief that this is so. To him, the development of causation was in fact slow and uncertain, constantly fluctuating between the language of personal guilt and culpability on the one hand, and more ‘neutralized’ notions of causality on the other.

The discovery that all natural phenomena have causes came not from philosophy but from ancient medicine, Lloyds says; the Hippocratic writer of *On Airs Waters Places* formulate it thus: “each [disease] has a nature and nothing happens without a natural cause”<sup>11</sup>, the writer of *On the Art*: “indeed, upon examination, the reality of the spontaneous disappears. Everything that happens will be found to have some cause, and if it has a cause, the spontaneous can be no more than an empty name”<sup>12</sup>. According to Vegetti this discovery (that all natural events has natural causes), arose *spontaneously* in the 4<sup>th</sup> century in the medical writings of the Hippocratic tradition, namely *On ancient medicine* (Vegetti 1999:284-286).

The treatise *On the sacred disease*, which is tentatively dated at the end of the fifth or the beginning of the forth century BC<sup>13</sup>, is one of the first texts to claim the existence of natural causes for all kinds of disease, and thereby in its implications, the existence of natural causes for all natural phenomena (Lloyd 1987:25). The treatise aims to establish that ‘the

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<sup>11</sup> *Corpus Medicorum Graecorum* I, chapter 22, 1 74.17

<sup>12</sup> *Corpus Medicorum Graecorum* I, chapter 6, 1 13.1-4

<sup>13</sup> cf. Lloyd (1987:15)

sacred disease', epilepsy, is no more sacred than any other disease. To suffer from 'seizures' is not to be seized by the gods, it is a disease with has natural causes, like all other diseases.

The opening words of the treatise:

"I do not believe that the sacred disease is any more divine or sacred than any other disease but, on the contrary, just as other diseases have a nature from which they arise, so this one has a nature (φύσις) and a definite cause (πρόφασις)". (*On the sacred disease*, chapter 1, 2f <sup>14</sup>)

In his arguments the writer of the treatise presupposes "the doctrine of the uniformity of nature, the regularity of natural causes and effects", argues Lloyd (1987:25-26). If an action is considered the single cause or an attributing cause to an effect, this action must uniformly lead to or contribute to this effect. Nature does not allow for exceptions. In the treatise the concepts of 'nature' (φύσις) and 'cause' (πρόφασις, αἰτία, αἴτιος) are closely related; 'nature', to the writer, implies a regularity of cause and effect, states Lloyd (1987:26). While the writer of the treatise argues that all diseases have natural causes, and that this excludes any divine intervention, he does not exclude divinity from nature: All diseases are natural *and* divine in nature<sup>15</sup>. Also;

"The idea of a necessary condition is first expressed in the form of the 'that without which' in Plato's *Phaedo*. But without any special terminology, the author of *On Ancient Medicine* certainly has a working notion of the distinction between causal and merely concomitant factors and conceives the former in terms of a set of factors that (as we should say) are together both necessary and sufficient conditions of the disease." (1987:54)

This treatise is representative of a change in paradigms of the way 'causes' and 'explanations' were viewed; references to divine intervention was no longer to be accepted as explanations. Lloyd 56: "The writer of *On the sacred disease* has a conception of nature, and a view of what constitutes a casual explanation, that rule out supernatural intervention in diseases." The emphasis of this treatise is the regularity of nature and reality; the divine influence<sup>16</sup> on nature must be regular and without exceptions to the rule of natural cause to natural effect. In Lloyds

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<sup>14</sup> Hippocrates, 1968. *Die hippokratische Schrift "Über die heilige Krankheit"*, translated by Hermann Grensemann, Berlin, de Gruyter.

<sup>15</sup> "This so-called 'sacred' disease is due to the same causes as all other diseases, to the things we see come and go, the cold and the sun too, the changing and inconstant winds. These things are divine so that there is no need to regard this disease as more divine than any other; all are alike divine and all human." (*On the Sacred Disease*, chapter 18, 1-2, Grensemann.). Thus all diseases are divine but only in the sense that divinity is present in nature and that nature cause disease.

<sup>16</sup> Which is not to be confused with intervention; divine influence appears to be described as some sort of immanent presence or a will being realized through the workings of nature, possibly also as the exclusively first cause of natural phenomena, though it doesn't seem described as so. Divine intervention were to be viewed, in Lloyds (1987:31-32) words; "either as the suspension of nature or as double determination".

effective summary: “Even when we have to deal with the divine, the divine is in no sense *supernatural*” (1987:27); there simply are no forces that counters those of nature.

Vegetti, however, finds that the treatise in its language is sliding in the direction of personal guilt and is therefore not a statement of ‘causation proper’.

Vegetti (1999:271) takes argument with the opinion that “a precise and well-defined conception of causality is present in fifth-century philosophy, history and medicine”. He contends that “explicit theoretical reflection on causal connections (...) emerged only gradually and with considerable uncertainty from the fuzziness of moral, political, and judicial language to do with culpability, responsibility, and imputability of facts and actions. Interestingly, the conceptualization of causality developed in medical contexts rather than in early Greek philosophy (judging from the fragments of the latter and setting aside the causal formulations provided by Aristotle and Peripatetic doxography)”.

Secondly, theoretical reflection on causality is not the same as claiming efficient causality of necessary antecedents. And lack of reflection on causation does not exclude the notion of necessary and sufficient causes (e.g. in medicine).

This bodes well, I think, for our interpretation of Anaximander; though he did not reflect explicitly on the notion of cause (that conceptually was unavailable to him) he might still have utilized ‘modern’ presuppositions about what causes are and what they must do.

Vegetti (1999:276) traces the development of *aitia* from “the fuzziness of moral, political, and judicial language” in the historians, and finds that in Herodotus (484 – ca. 425) the language does not depart from the traditional uses in contexts of justice, ethics, politics, and religion (1999: 276-277). However, vague signs can be found of a shift towards a transference from the domain of responsibility to that of causality, e.g. the presence of the cause in connection with its effects. Also, natural phenomena are considered *aitios*, which is a sign of “a transition, however vague and unarticulated, in the direction of a type of causal thinking” (Vegetti 1999:277). Thucydides (470 – ca. 403) in his *History* uses the word *aitia* when describing the plague at Athens and combines it with *dynamis*, the power to produce something. Thus he gives the passage a distinctly causal sense and aligns it with certain medical texts such as *On ancient medicine*, that makes a still greater advance in this direction (1999:278). In regard to a tidal wave, Thucydides states his opinion of the cause (*aition*): “an earthquake without which I do not think such an event could have happened”. Here we then have (i) the extension of the concept of responsibility to any phenomenon; but also (ii) a

formulation of the necessary presence of the cause in connection with its effect. It is a beginning of a transition towards causal thinking, but it is still vague and without any conceptual generality.

A more decisive step taken in the direction of conceptual generality we find in the medical writers, Vegetti claims (1999:280). An intermediate position between the *aitia* of ‘personal culpability’ and ‘abstract causation’ is occupied by three treatises: *On the sacred disease* and *Airs, waters and places*, which are similar and rather old<sup>17</sup> and *On the nature of man*<sup>18</sup>.

Some have read a full-fledged theory of natural causality from the opening lines of *On the sacred disease* (e.g. Lloyd), Vegetti comments (*ibid.*). The Hippocratic writer will specify the explanation of ‘the sacred disease’, he says, while his opponents, the magicians and purifiers, attribute the disease to the divine so that if the patient die, “they can have the excuse (*prophasis*) to advance that not they but the gods were culpable (*aitioi*)”. Here, Vegetti argues (1999:280), the language slides clearly in the juridical direction of blame and exculpation, which indicates an evident conceptual vagueness in the meaning of *aitia*. But the text further (section 6): “It is the brain which is responsible (*aitios*) for this ailment, as with all other serious diseases. In what way and for what reason (*prophasis*) it happens, I will clearly declare”. To Vegetti this is proof of a language resembling that of the law courts; where the guilty party to some crime has been identified. I beg to differ. For could not we still, today, say that it is some function of the brain that is causing such an ailment as epilepsy? And could not a medical doctor tell us how and why such medical conditions occur? That the Hippocratic writers identified the *entire* brain as cause and not *some function* in the brain reflects more on the profession of medicine than it does the notion of cause, or so I think.

Vegetti sees the same point emerging more visibly in *Airs, waters and places*, but he further writes: “It is very difficult to distinguish here between responsibility and cause on the one hand, and between explanation and cause in the strict sense on the other hand” (1999:281). I am not ungrateful to this comment by Vegetti himself, as this is one of my main objections towards his representation of the development of the notion of causation. Though it is true that the basis of ‘*aitia*’ is ‘responsibility’, I cannot believe that a notion of causation as such not can contain any connotations of responsibility or guilt, metaphorically speaking. Naturally it is difficult to distinguish these notions, as there are many instances even today where one would use ‘cause’ to express personal responsibility (e.g. ‘who caused this?’).

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<sup>17</sup> Possibly from ca 420 BC; the oldest Hippocratic treatise is said to be from ca. 440 – 430.

<sup>18</sup> Probably from the beginning of the fourth century.



Vegetti further writes (1999:282) that the excess of reasons adopted by the author cannot amount to a genuine causal nexus, but rather to a system of explanations. But surely, explanations shall not be sharply distinguished from causes? As we know, to explain something is often the same as to cite its causes, and when citing causes, we tend to give explanations<sup>19</sup>. It appears that Vegetti defines ‘causation’ far stricter than we even would today with the modern, ‘neutral’ term.

Throughout the different Hippocratic treatises, Vegetti follow said development of the causal concept and then asserts (1999:284): “It is clear that at the end of the fifth century in medial thought of a sophistic tenor, the causal structure of explanation in medicine had arrived, for the first time, at a level of appreciable conceptual generalization”. He finds that this process achieves its final refinement in *On ancient medicine*:

“Whoever having undertaken to speak or write on Medicine, have first laid down for themselves some hypothesis to their argument, such as hot, or cold, or moist, or dry, or whatever else they choose (thus reducing their subject within a narrow compass, and supposing only one or two original causes of diseases (*archen tes aities*) or of death among mankind), are all clearly mistaken in much that they say;...” (Hippocrates, *On ancient medicine*, The Internet Classics Archive, transl. Francis Adams)

From these opening words, it appears that the author criticizes those that ascribe the blame for any disease on one or two original causes (e.g. the hot and the cold), but it could also mean to address those that ascribe the beginning of *the causal process* (*archen tes aities*) to any one or two elements or qualities (1999:284). In this text, the conceptual divide between culpability or responsibility and causality appears definitely to have been crossed in this passage: “We must surely consider the cause (*aitia*) of each complaint to be those things the presence of which of necessity produces a complaint of a specific kind, which ceases when they change into another combination” (19.3 transl. Jones<sup>20</sup>).

This is considered by Vegetti to be the clearest, the most general, and the most conceptually precise idea of causality to be found in the fifth-century thought. A cause is there considered as such when (i) its presence produces a certain effect, (ii) this effect is necessarily determined and in an univocal manner, (iii) its absence or alteration determines the failure of

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<sup>19</sup> Hankinson (1998:4): “The two ideas are clearly connected: when we explain something, we generally give reasons for its being the way it is; and to give reasons why something is the way it is frequently involves an account of the causes of that thing. Conversely, by specifying the causes of some event or state of affairs, we are inclined to think that we have gone at least some of the way towards explaining it.” Psillos (2002:2): “Intuitively, explanation and causation go hand-in-hand. Isn’t it a platitude, after all, that in order to explain something, you need to cite its causes? (...) causes do explain and explanation does proceed via stating causes.”

<sup>20</sup> Jones, W.H.S., 1979. *Philosophy and medicine in ancient Greece: with an edition of Peri archaies ietrikes*, in the series *Johns Hopkins University Press reprints*, New York, Arno Press.

the effect. All this precisely anticipates Plato's *Phaedo*, but also the definitions of cause more rigorously stated in Aristotle's *Metaphysics*.

There is something to be said about this, however. The text speaks of 'the *aitia* of the *complaints*', which certainly indicates that some sort of culpability; is it not an identification of a guilty party here, guilty of something to which one would complain? As to the explicit conceptual generalization that Vegetti previously has connected to causation proper, where is that? There is necessity, efficiency, and a contrafactual conditional ('if not *a*, then not *b*'), but no clear explication of generality. That 'each complaint' refers to complaint of all kinds does not make it refer to universal events. If one reads generality from this text, then, I contend, one can certainly read such from Anaximander, too.

To Hankinson (1998:64) this treatise represents empiricism rigidly applied and distrust of metaphysical theories as that of 'the hot' and 'the cold'. In spite of Hankinson's thorough investigation of the treatise's language and types of explanation, he does discover any revolution of causal thinking or causal concepts.

Vegetti seems to base a great deal of his differentiation of concepts on the difference between 'cause' and 'culpability', and in his examination of the evidence he seems to exclude any causal talk that has moral or judicial connotations. But I cannot see that these concepts are strongly enough separated to warrant such as differentiation. As previously stated, we can very well hold a person that has caused something responsible, and in fact, we constantly do that. "When did the transition occur from the personal language of culpability (...) to the abstract and 'neutralized' language of cause?" Vegetti asks (1999:274). From this it appears that the use of *aitia* in non-human affairs implies causation and the use of *aitia* in human affairs imply culpability. If that is so, human affairs cannot possibly be the subject of causal thinking. And that seems like an unreasonable demand. Surely we still apply moral-judicial dimensions to our concepts of causation, if and when the cause is something that a moral being (a human) is the cause of, and thus responsible for. The difference is that we *also* apply causal terms to entities or states wholly without human intentionality involved, thus bereft of moral-judicial terms. To us, a thrown rock can be a cause. To an archaic Greek, the thrower of the rock is the cause, or the aim of the thrower, or the art of throwing<sup>21</sup> etc. While the differences in the causal analysis implicit in these two statements are multiple, (e.g. the relata

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<sup>21</sup> As previously referred; "For Aristotle in more theoretical contexts will tell that it is not the sculptor working on his sculpture who is the moving cause, but the art of sculpture" (Frede 1987:126)

of causation, the active nature of the cause, the extension of causation to non-anthropomorphic events etc.) there is still causal concepts in the archaic analysis.

Vegetti further relies to a great extent on Frede's (1987) definition of *aitia* and its generalization. However, Frede repeatedly and explicitly connects causation with responsibility, e.g. stating that while the opponents of the Stoics are interested in explanation (thus counting non-propositional items as causal relata), the Stoics themselves are solely interested in responsibility. They engage in causal analysis because of their moral and juridical interests, not for the sake of causality itself. "Hence it would seem that the Stoic interest in causes does not arise from an interest in actual explanation. The evidence, rather, suggests that the Stoic interest in causes arises from their interest in responsibility." (Frede 1987:131) It seems, then, if we are to follow Vegetti's definition of causation proper, that the Stoics, the inventors of efficient cause and propositional items as causal relata, are not engaged in causation, only in some older, broader concept of culpability. This, self-evidently, cannot be correct.

Now that we have seen how the fully developed notion of causation supposedly is manifested, let us examine how, then, Anaximander is viewed in causal history.

### 2.3 Presocratic causation

Concerning the Presocratics, Vegetti says (1999:273) that in the philosophers succeeding Anaxagoras, "we find the widespread idea of a dependence of things and processes on the "power" of an originating principle (*arche*) (...) There appear, especially in Empedocles and Anaxagoras, principles that much later would be interpreted as prefigurations of (efficient) causality<sup>22</sup>: in the first case, Love and Strife (*philia* and *neikos*), in the second case Intelligence (*nous*). These principles exert their actions on other originating principles of a biological kind, such as the 'roots' (*rizomata*) of Empedocles and the 'seeds' (*spermata*) of Anaxagoras". But surely, as we shall see, this dependence on an *arche* is to be found in Anaximander also, as well as one could read 'justice' exerting its action on the biological 'sees' or 'the opposites' (though I would not necessarily agree to that interpretation) as a prefigurations of causation. I can only assume that Anaximander is not mentioned because of his age and the lack of definite sources.

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<sup>22</sup> For the record, an interpretation would Vegetti disagree to.

Vegetti further: "...in Empedocles' text Love and Strife seems to be somewhat anthropomorphic metaphors for the cosmic elements' aggregation and separation, not separate from the elements themselves".

In contrast,

"Anaxagoras' principle *Nous* is explicitly conceived as separate from the things on which it exerts its own action. This is probably why Plato in the well-known passage of *Phaedo* (97b ff) refers to Anaxagoras as the initiator of the idea of final causation (...) It seems clear that this embryonic form of causal thinking is still *completely clad in metaphorical language* derived from the political sphere. The need to explain the beginnings of the cosmic order does not imply a theoretical reflection on the concept of cause, but rather it is forced to *express itself* in terms of the power that the gods exercise in the world or that men exercise in society, just as in Anaximander the language remains juridical and ethical." (1999:273, my emphasis)

The fact that Vegetti speaks of primitive causal thinking 'clad in metaphorical language' obligates him to the view that there is some form of causal thinking even if completely covered by a metaphorical veil. Furthermore, the explanation is forced to express itself in terms originally applied to divinity, Vegetti says. But the form of the expression through which a notion is expressed does not negate any content not originally intended. What I mean is that a notion understood as 'belief' or 'opinion' or 'idea' does not necessarily need a precise conceptual manifestation in language or symbols in order for it to exist; and though it is not very easy, we can find it even hidden behind concepts of other, at least originally, intended use and contexts.

The early Greek philosophy is marked by "virtually total absence of any reflection on the problem of causal explanation", Vegetti (1999:274) holds. To that I certainly agree, they, at least the Milesians, gave explicit causal explanations and were content with that. While the evidence on them includes abundant references to the language of cause, he holds that the evidence has no value whatsoever, because it depends on Aristotle (*ibid.*). As first-hand testimony the evidence from Aristotle has no value, that is true, but in representing the Milesians' explanations the notion of cause or some earlier prefigurations of this should be made visible also through the testimony of Aristotle.

There are, however, arguments for a slightly different historical placement of Anaximander. Lloyd has this to say on Anaximander:

"Furthermore our sole surviving fragment of Anaximander is generally and surely rightly interpreted as conveying an idea of the world-order through the legal metaphors of justice and reparation for

wrong-doing, and if that is correct, then it may be that he had some conception of natural phenomena as a totality as subject to determinate physical causes” (Lloyd 1987:33).

Anaximander expressed a world-order, it is stated, i.e. a matrix or set of rules that the things of the world must adhere to, which might indicate that he believed all natural phenomena had causes. For now, that is all I need. If we allow ourselves the possibility of Anaximander arguing universal causation, I think we have come a long way from other, traditional ways of portraying Anaximander’s conception of causality:

“...the concept of teleology, [is] the idea that the whole world is somehow fulfilling a purpose formed by a supernatural mind. Teleology is a luxuriant offshoot of the anthropomorphic tendency which Greek philosophy inherited from mythology and religion and never completely threw off. In popular religion it was the gods, Zeus above all, who ruled the world by the application of larger-than-life human motives. In Anaximander change was kept within bounds by the sociological metaphor of retribution for excess (...) Heraclitus exemplifies a transitional stage at which cosmic intelligence [*Logos*] simply produces a predetermined regularity, much as in Anaximander the principle of Dike ensured the balance of opposed world-constituents. Dike and *Logos* are structural laws, from one point of view, determining events as it were from behind, rather than a purpose or end drawing them on from in front. They had a predecessor in the *Moirai* or destiny which even the gods could not contravene” Kirk (1961:115).

Here, Anaximander involved in the context of teleology, although in a ‘transitional state’. But as events determined from ‘behind’ is a case of *efficient* causation and not *final*, it is not, I think, suitable to place Anaximander at such a point in the evolution of causality. That we see from the failed attempt at placing Anaximander as a teleological without an end.

What is it that constitutes causal thinking? The mere use of the word *aitia* we have seen does not even remotely imply causation, and even complex conceptualization of causation does not imply the fully developed concept of causation, or the mere beginnings of efficient causation. I have argued that Vegetti’s definition of causation as opposed to culpability is far too strict<sup>23</sup>, and shown that Lloyd but for the lack of direct evidence attributes the Milesians with notions of causality. Lloyd emphasizes regularity in nature, which without doubt is highly important to the praxis of generating natural explanations, but that does not necessarily make it so that causation has that very same regularity as basis; neither conceptual or as an idea. In this manner Lloyd may seem to be question-begging of a regularity analysis of causation<sup>24</sup>. Though it is not necessary for Lloyd to be applying an ontological regularity analysis of

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<sup>23</sup> Also Hankinson (1998:17) that indicates that causation proper cannot have *intentional agents* as causal relata.

<sup>24</sup> Regularity analysis of causation means that one holds regularities of nature as constitutive of causation; causation is experienced through regularities because that is all of causation.

causation as such, he certainly expresses the view that causation epistemically is regularity and little else. However true this might be, it is question-begging.

Without going too far with this argument, it seems that regularity analysis of ancient causality is ill-fitted:

As was stated in the introduction, the original responsables were the gods. It is evidently so, or so I believe, that the idea of divine responsibility is invariably connected to two explanatory phenomena: (i) the notion of personal responsibility, as we will see from the many meanings of *aitia*; for the gods were always anthropomorphic creatures (though they frequently had other forms, e.g. Chaos or Night, the gods would appear in many forms, some more, some less human, and even the more ‘abstract’ deities behaved invariably in an anthropomorphic manner; an anthropomorphism to which Xenophanes famously objected<sup>25</sup>), and (ii) the notion of an effecting cause. While this last statement might seem quite contrary what we know of the wideness of the meaning of *aitia* the argument is not that ‘divine causation’ was exclusively limited to efficient causes, but that the notion of an efficient cause seems to *always have been present* in causal notions, at some level, among many other notions<sup>26</sup>. For when one speaks of gods as causes, or the gods causing something, surely one does not mean that the god simply by *existing* is the cause of something, but rather that the god preformed some sort of *action* that in turn caused that which the god is said to have caused (not necessarily by use of the term ‘cause’) and in this way the god was the cause of something happening.

It appears then that regularity is how causality manifests itself and not what causality consists of, to the ancients. To this is the fact that the term *aitia* originally meant responsibility and were attributed to gods and humans. Though human action can be said to be regular, even though I would say that depends on one’s perspective, but divine intervention is nothing but the opposite. Whether or not it is to ascribe to the Greeks the view that animals could be guilty I leave to the scholars<sup>27</sup>. The Greek gods acted anthropomorphic, which means

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<sup>25</sup> See KRS 166-169. A sample of Xenophanes’ critique: “The Ethiopians say that their gods are snub-nosed and black, the Thracians that theirs have light blue eyes and red hair” (KRS 168); “But if cattle and horses or lions had hands, or were able to draw with their hands and do the works that men can do, horses would draw the forms of the gods like horses, and cattle like cattle, and they would make their bodies such as they each had themselves” (KRS 169).

<sup>26</sup> “So for the Stoics the notion of a cause still has a connotation, however tenuous, of responsibility. But for the notion of responsibility to have any content at all that which is responsible *must in some sense or another have done something* and thus become responsible”. (Frede, 1987:131, my emphasis)

<sup>27</sup> Pearl (2000:332) seems to think so, though I believe animals only are perceived as responsible in a very limited kind of way.

that they sometimes acted irrationally and often quite contrary to what one would expect<sup>28</sup>. Regularity of action has nothing to do with the guilt of the original *aitia*.

The term ‘guilt’ picks out those attributes and connections between objects, events, or facts that are in themselves causal – meaning that causality is, in some way, *primary*. Conceptually our starting-point is not some fundamental level for causality to supervene (or however this relationship is formulated) on, but something that presupposes causality – be it ‘necessity’, ‘accidents’, ‘guilt’, ‘reason’, ‘aim’ etc. All of these terms point to some relation between events or bodies or facts that enable us to claim that the one is somehow responsible for the other.

My finishing words on the historical investigation are these: There is a common supposition among the historians of causation that causation proper should contain a clear reference to conceptual generality. And though this generality often is expressed as the regularity of natural events, it is of course not question-begging, any concept must be general for what is generally intended by it. However, I will later in this essay show that Anaximander, too, clearly expresses generality of causes in his physical explanations.

### 3: Anaximander

#### 3.0.1 The historical figure

Anaximander was a younger contemporary of Thales, from the same city, Miletus in Ionia, and he is traditionally counted as Thales’ friend and pupil. Whether their relationship was one of master and pupil, of competition, or anything else, we do not know. The antique tradition of describing two fellow citizen philosophers of eclipsing age as master and pupil has more likely than not overridden any historical accuracy in the description of this relationship. Apollodorus says that Anaximander was sixty-four in the year 546 or 547 BC, thus being born in 610 or 611<sup>29</sup>. Anaximander is traditionally counted as the first of the ancient Greeks that published a treatise on nature. This book is known to us as *On Nature*, Περὶ φύσεως, though the title of it is almost certainly given to it later in antiquity, by Alexandrian writers.

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<sup>28</sup> “Homer and Hesiod have attributed to the gods everything that is a shame and reproach among men, stealing and committing adultery and deceiving each other” (Xenophanes, Fragment 11, Sextus *adv. math.* IX, 193 = KRS 166)

<sup>29</sup> Diogenes Laertius II. 2 = DK12 A1

According to some reports<sup>30</sup>, Anaximander's book contained the history of the world and all its inhabitants and their cultures, including the geography of the earth, starting with the creation of the world and progressing from there. If that is the case, then only the very beginning of the book is known to us and the doxographers.

Anaximander is also famed for creating a *gnomon*, a primitive sundial, which was set up at Sparta, but this was probably not an invention of his but rather an import from Babylonia. He is also credited with the construction of a sphere, some sort of model of the heavens, but this is not considered likely. It was said about Anaximander that he travelled widely, visiting Egypt and other places. He is famous for having drawn the first map of the earth's surface, possibly in connection with the history of the world as presented in his book, but only the creation of the map is well-authenticated<sup>31</sup>.

Finding contemporaries of Anaximander (ca. 610 – ca. 546) in order to compare use of language and notions proves problematic, as there are precious few true contemporaries of him in the philosophical tradition. The closest are Thales, said according to some sources to be only fourteen years older and died within the same Olympiad as Anaximander (thus: ca. 624 – ca. 546) and Anaximenes, Anaximander's pupil, born about 580 and died around 525. Other near-contemporaries (I have thus defined 'contemporary' as something like 'theoretically able to mutually influence each other in thought and language', and 'near-contemporaries' as 'chronologically eclipsing life spans') are Xenophanes (ca. 570 - ca. 480), Pythagoras (ca. 570 – ca. 490), and Heraclitus (ca. 540 – ca. 480/470). As Thales left nothing of writing he is automatically excluded from the list of witnesses. His pupil Anaximenes shared his interest in physical explanations of worldly phenomena, but not, as such, the capability of creating bold theories on implicit causation.

Of the above the only explicit reasoning about some very early form of causation is the interesting arguments taken from Xenophanes' rational theism about the nature of causing and generation (cf. Hankinson 1998: 26-28). While Xenophanes too was from Ionia, there is no evidence of the two philosophers ever exchanging ideas, neither in texts or doxography. If Anaximander indeed had some notion of what it would mean to make something else happen (this inelegant formulation simply to avoid the word 'causation'), he was evidently quite alone in this endeavour.

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<sup>30</sup> Guthrie (1977:75) refers to Heidel and his "minute examination of non-Peripatetic sources"; also Cherniss for the following information.

<sup>31</sup> See Heidel, William Arthur, 1921. *Anaximander's book, the earliest known geographical treatise*, in the series *Proceedings of the American Academy of Arts and Sciences*, Boston, pg 240-288.



### 3.1 Sources

The collection of the views of the early Greek philosophers we owe to Hermann Diels and his *Doxographi graeci* (1897) and especially *Fragmente der Vorsokratiker* (1903), which later was revised by Walter Kranz. This is still *the* work on the Presocratics and is referred to in this essay as the DK (for Diels-Kranz). ‘Doxography’ is a term coined by Diels; from the Greek ‘doxa’ meaning *notion, mere opinion, tenet*. The doxographical tradition begins with Theophrastus’ sixteen or eighteen book topic-oriented treatise; the Φυσικῶν Δόξαι, *Tenets of the natural philosophers*, as all the ancient doxographers who write on the Presocratics depend in some way on this lost work, only some very few fragments from this book are known to us. Anaximander’s philosophy is therefore interpreted by and delivered to us through Aristotle and his pupil and successor Theophrastus<sup>32</sup>.

The practice of collecting views of earlier philosophers is nearly as old as philosophy itself. Mansfeld (1999:26-27) writes that the sophists Hippias and Gorgias composed collections of views by the earlier philosophers. Plato and Aristotle presumably used these collections and were influenced by them; they combined the approaches of Gorgias<sup>33</sup> and Hippias<sup>34</sup> and added to the material these two had collected. Plato we may well believe had studied the original works of Presocratic philosophers, still, his approach to these was coloured by their reception in the sophistic works. In Plato, then, we have not doxography but a form of dialectic, Mansfeld writes (1999:27).

We are not certain that Aristotle’s school Lyceum had a copy of Anaximander’s *On Nature* to consult. Both Aristotle and Theophrastus wrote abbreviations of the teachings of earlier philosophers, not detailed, source-referring presentations of singular philosophers. In these abbreviations the older philosophers usually were grouped together thematically, sometimes unsuitably so. Also, Aristotle often uses the Presocratics’ writings mainly to highlight some point of his own as e.g. in the *Physics* and *Metaphysics*, where he wants to show how the preceding philosophers faulted by focusing exclusively on physical causes, an error he now has mended with his four causes.

Guthrie evaluates Aristotle thus (1970:41-42): “He was a systematic philosopher first and a historian second, and his examination of his predecessors was explicitly directed

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<sup>32</sup> Anaximander’s book is not known to have been consulted by any historian of philosophy later than Aristotle and Theophrastus, although Apollodorus made some use of it in his chronology (following Diogenes Laertius II, 1-2 = DK12 A1).

<sup>33</sup> Gorgias stressed what he took to be philosophers’ insoluble disagreements.

<sup>34</sup> He put together an anthology of related views in both prose and verse, emphasizing agreement and continuity of ideas as he assembled related views from the old poets down to just before his own time.

towards eliciting how far they had travelled along the path that led to his own conception of reality. That this might not have been their aim (...) does not (naturally enough) occur to him". Guthrie overall gives Aristotle quite a good verdict as a historian of and reporter on his predecessors in philosophy, but, "his most serious fault is likely to be, not actual misunderstanding, but a distortion of the balance of their interests by rigorous selection. He was only concerned with one facet of Milesian thought, the 'philosophical', that is primarily the cosmogonical" (Guthrie 1970:43). From this, the problem with Aristotle is what he doesn't say, rather than what he does say. As far as our subject – Anaximander – is concerned, Aristotle only mentions him by name four times<sup>35</sup> but references to him anonymously repeatedly throughout his work (e.g. the passages<sup>36</sup> where Aristotle presents the sayings of anonymous philosophers who postulate an intermediate element between fire and air or between air and water).

It is more than likely that some misinterpretation or misrepresentation of Anaximander's thoughts is present somewhere in Theophrastus report on Anaximander. But if Theophrastus is not correct in his representation of Anaximander, where shall we look for a correct, or even in the slightest degree better, representation? As Kahn (1994:11) states it; "For the sixth-century Milesians, there is no source of information outside the doxographical tradition". As he is Aristotle's pupil, Theophrastus elaborates on his master's opinions and is more a representative of Aristotle's view than a presenter of his own. Where Aristotle and Theophrastus differ in their representation of Anaximander, Theophrastus is the more thorough as a historian of them. About Theophrastus Guthrie says (1970:18) that it must be remembered that Theophrastus' motive in reporting the views of earlier Greek philosophers is by no means purely historical. Theophrastus makes no conscious effort to free himself from the doctrine and terminology of his master and the philosophical school that Theophrastus himself later was to become head of. But, at the same time, Guthrie writes (1970:19-20), "Theophrastus is capable of correcting or avoiding an occasional slip on the part of his master. There are a surprising number of cases where Aristotle is guilty of strange verbal errors in the interpretation of a text which he cites directly. This kind of carelessness in the use of original documents is not, as far as I can see, attested for Theophrastus". Thus the real historical value of Theophrastus' account appears wherever he diverges from, or goes beyond, the statements of Aristotle, e.g. the statement that to Anaximander *to apeiron* was the *arche*, a statement which is never directly expressed by Aristotle, and that from the *apeiron* "arise all

<sup>35</sup> In *Physics* I.4, 187a20; III.4, 203b14; *de Caelo* II.8, 295b12; *Metaphysics* 1069b22

<sup>36</sup> *De Generatione et Corruptione* II.5, 332a19; *Physics* I.4, 187a12; III.4, 203a16; *de Caelo* III.5, 303b10

the heavens and the worlds within them”. To Guthrie this means that Theophrastus did not restrict himself to the Aristotelian texts, but referred directly to whatever original sources were available to him. The verdict, then, is that “we may say that Theophrastus ranks as a documentary source wherever he tells us more than Aristotle does on the same point, and that any apparent disagreement between the two writers may almost invariably be resolved in favour of the version of Theophrastus” (Guthrie 1970:22). Other extensive evaluations of Aristotle and Theophrastus as historians of philosophy are to be found in chapters concerning the sources on the Presocratics; in Kahn (1994:9-24), KRS (2004:1-6), and Mansfeld (1999, entire text). For a more pessimistic evaluation of the accuracy of Theophrastus’ writings than what has been presented above, see McDiarmid (1970)<sup>37</sup>.

The *Tenets of the natural philosophers* of Theophrastus is known to us through these sources:

1) The work on the history of philosophy preserved as the *Placita* by pseudo-Plutarch and as part of Ioannes Stobaeus’ *Eclogae Physicae*. These two texts were reunited by Diels as fragments of a Hellenistic writer only known by his name Aëtius; 2) the remarks of the Neoplatonic Simplicius in his commentary on Aristotle’s *Physics*; 3) the brief history of Greek philosophy given by Hippolytus as an introduction to his *Refutation of all heresies*; 4) the excerpts quoted from the *Stromateis* of Pseudo-Plutarch by Eusebius in his *Praeparatio Evangelica*. These are the four primary sources on Anaximander. Among the minor sources are Diogenes Laertius, Cicero, Seneca and Censorinus.

The commentaries on Aristotle’s *Physics* and *De caelo* by the Neoplatonic Simplicius are highly important to our understanding of early Greek philosophy, writes Mansfeld (1999:38). Simplicius cites several early Greek philosophers on an unprecedented scale<sup>38</sup>. When writing he repeatedly affirms that he is making use of Theophrastus. He sometimes quotes the statements of Theophrastus not from a direct consultation of the *Physical Opinions*, but from the excerpts given by Alexander in his lost commentary on the *Physics*. “For Theophrastus’ discussion of the ἀρχαί, Simplicius is thus our best source; for the rest of *Physical Opinions* he is scarcely a source at all”, Kahn writes (1994:15).

All of the information which Hippolytus gives us concerning Anaximander, Kahn says (1994:16), comes from Theophrastus and no other source. He is drawing upon an epitome in

<sup>37</sup> e.g. “If Aristotle has misinterpreted both the nature of the Infinite and the nature and functions of its constituent parts, and if Theophrastus has merely repeated his misinterpretation, what positive historical value have their accounts?” (McDiarmid 1970:199).

<sup>38</sup> He is our only source for the extant verbatim fragments of Zeno and Melissus, for almost all the extant verbatim fragments of Anaxagoras and Diogenes of Apollonia, for the more important fragments of Parmenides, and for a great number of fragments from Empedocles’ physical poem (Mansfeld 1999:38).

which the information is spread throughout the books of the *Physical Opinion* had been grouped under the names of the various thinkers. The minor discrepancies (from Simplicius) are to be explained by the fact that the version of Hippolytus has passed through more hands. Where the text of Hippolytus is not obviously corrupt, it may in general serve as a direct substitute for Theophrastus.

The documentary value of Pseudo-Plutarch's text is not on par with that of Simplicius or Hippolytus. The author is given to very free paraphrase, and his report is vague, incomplete, and not always free from confusion. Nevertheless, he gives some information of great interest which is preserved nowhere else, and whose general accuracy is not open to suspicion, Kahn writes (*ibid.*). Aëtius' work on *Placita* is the most systematic and the least satisfactory of all ancient histories of philosophy, according to Kahn (1994:16-17). In general, the simpler and more factual matters are likely to be reported by him without serious damage, not so with the more complex or more unfamiliar doctrines.

All in all the testimonia, in which the majority of the ancient sources tend to assemble and oppose to each other several philosophers' views, rather than discussing those of individuals, are often unreliable as the author has assembled philosophers we now know to be of quite different opinions under one opinion or heading.

The conclusion to this is that even if we can coherently reconstruct the opinions of the Presocratics, through the Aristotelian-Theophrastian sources and/or others, we should not take our reconstructions as decisive to their opinions or arguments. The heritage on Anaximander is a heritage of interpretation and not of citation. Only if accompanied by direct quotations from the philosopher's work itself that are suitable to confirm our interpretations, we can confidently argue the appropriateness of our interpretations. Though certain interpretations can assume some sort of validation through the comparison with sources of other origins and well-argued internal coherence, no argument to the opinions of Anaximander will be *conclusive* until further direct quotations of his is presented to us. As that seems not very likely to happen, we have no choice but to construct that version of Anaximander which balances best between what the cultural matrix of Anaximander's particular time and place would allow, and what a clear, rational and ingenious philosophical mind plausibly could have argued.

### 3.2 Cosmogony and cosmology

In order to examine and interpret the sayings of Anaximander for causal implications, we first need to examine the sayings of Anaximander as such, as it is not a given what they amount to. I will therefore in the following present Anaximander's explanations of natural phenomena, limited to that information evaluated as somehow touching upon the subject of causality through statements on creation, destruction and sustenance of physical processes.

The major features of Anaximander's cosmogony are as follows<sup>39</sup>: The cosmos has its origins in the eternal (and possibly eternally moving) qualitatively and quantitatively indefinite primary substance<sup>40</sup>; the Unlimited. The creation of the cosmos happens in stages. In the first stage, the Unlimited separates off a seed (γόνιμον) which is able to generate 'the hot' and 'the cold'. These opposites are presumably already present in this seed, probably because the potentialities of all things are present in the Unlimited<sup>41</sup>. In the second stage, the opposites are generated, manifesting themselves as a ring of fire (with the attributes hot and dry) and a ring of air or mist (with the attributes cold and moist), the former surrounding the latter. Part of the moist air dries out and becomes the earth. This is however never explicated in the fragments. At the third stage, the opposites give rise to such tension between each other that the fire that bark-like surrounds the air (and the earth within it) explodes. The fiery bark separates into smaller pieces that are hurled away from the cosmological centre, and these pieces of fire form rings at unequal distance from the centre. Some of the misty air has been redistributed by the explosion, and are now surrounding the rings of fire, leaving open only small holes which through the fire shines. These fires which can be perceived through the holes are our experience of the heavenly bodies. There is a constant struggle between the opposites, so the holes will at times be partly or fully closed by mist, at other times the fires will dominate them and shine unhindered. Thus Anaximander explains the earth with its air and water in the centre of his cosmos, the heavenly bodies, and astronomical phenomena such as phases of the moon and periodic eclipses.

From this cosmogonical explanation follows an explanation of life on earth: When the moist parts of the earth is dried up by the surrounding fire, slime or mud comes into existence, and in this mud living creatures arise. They are fish-like creatures. They are born in the wet parts of the world, the ocean, and are surrounded by thorny barks. When they reach the drier

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<sup>39</sup> In this abstracted version of Anaximander's cosmogony I follow the interpretation Algra (1999:47-48).

<sup>40</sup> Even though it can be problematic to apply the term 'substance' to the Unlimited, τὸ ἄπειρον is without doubt intended as a (the) primary physical entity, even if unavailable to the human senses, and so I stick with this use of language (the only other real candidate is 'stuff', which I for reasons of clarity do not wish to use).

<sup>41</sup> I have added the explanatory line to what Algra explicitly states, as this is how I read him.

parts, the land, the bark breaks off and the creatures live on land for a while<sup>42</sup>. As for humans, they also were born in water, but as human infants are helpless for the first years of their existence, they could not have come into existence as other animals. Therefore the first humans started as embryos in fish-like creatures, then emerged from these when they were strong enough to nourish themselves. Then, like other animals, they reached the dry land and lived there.

Anaximander was clearly ambitious in his attempts to explain natural phenomena. The following long passage on Anaximander by Hippolytus shows his range as philosopher of nature:

”He said that some certain unlimited nature is the origin of things, from which are generated the heavens and the world in them. It is eternal and ageless, and encloses all the worlds. He speaks of time, generation and existence and destruction being determinate. He said that the unlimited is the origin and element of things, and was the first to call it ‘arche’. Furthermore, there is an eternal motion, as a result of which the heavens are generated. The earth remains aloft, unsupported by anything, because of its equidistance from everything. It is rounded and circular in shape, like a stone pillar. We walk upon one of its surfaces, the other being opposite. The stars are generated as a circle of fire, separated off from the fire in the world and surrounded by air. There are certain flute-like passages, or blow-holes, through which the stars appear; hence eclipses occur when the blow-holes are blocked. The moon appears sometimes to wax, sometimes to wane, according to whether the passages are blocked or open. The circle of the sun is twenty-seven times larger <than the earth and the circle of><sup>43</sup> the moon <eighteen times larger> and the sun is highest, the circles of the fixed stars lowest. Animals are generated <from moisture> evaporated by the sun. Humans originally were like another type of animal, namely fish. Winds occur when the lightest vapours are separated off from the air, moving whenever they congregate; rain from vapour sent up from the earth by the sun; lightning when wind falls upon the clouds and tears them apart.” (Hippolytus, *Refutation* 1.6.1-7 = DK12 A11 = KRS 101B, 122B, 124-125, 129, 136).

While Anaximander’s often dogmatic claims about the size of the heavenly bodies has generated interesting theories as to why and how he came up with these exact numbers<sup>44</sup>, these subjects will not be further touched upon in this essay.

### 3.2.1 The Unlimited as the origin

“Of those who say that it is one, moving, and infinite, Anaximander, son of Praxiades, a Milesian, the successor and pupil of Thales, said that the principle and element of existing things was the *apeiron* (τό ἄπειρον), being the first to introduce this name of the material principle (τῆς ἀρχῆς). He says

<sup>42</sup> Possibly Anaximander meant that these first land-creatures were short-lived because they adapted to life on land, and lived just long enough to breed descendants that were better suited to the dry environment.

<sup>43</sup> The text of Hippolytus is incomplete, and the parts within angle brackets are added, mainly by cross-referencing to other sources, in order to attempt to restore the original phrasing. Ordinary brackets in footnotes are explanatory notes, added to provide contextual information.

<sup>44</sup> cf. KRS (2004:135-137)

that it is not water or any other of the so-called elements, but some other *apeiron* nature, from which come into being all the heavens and the worlds in them. And the source of coming-to-be for existing things is that into which destruction, too, happens ‘according to necessity; for they pay penalty and retribution to each other for their injustice according to the assessment of Time’, as he describes it in these rather poetical terms.” (Simplicius, *Physics* 24.13 = DK12 A9 = KRS 101A)

“Now Anaximander was the disciple of Thales. Anaximander, son of Praxiades, of Miletus. ...said that the principle and element of existing things was the *apeiron*, being the first to use this name of the material principle. In addition to this he said that motion was eternal, in which it results that the heavens come into being. ...he said that the material principle of existing things was some nature coming under the heading of *apeiron*<sup>45</sup>, from which come into being the heavens and the world in them. This nature is eternal and unageing, and it also surrounds all the worlds. He talks of Time as though coming-to-be and existence and destruction were limited.” (Hippolytus, *Refutation* 1.6.1-2 = DK12 A11 = KRS 101B)

“Anaximander, who was the companion of Thales, said that the *apeiron* contained the whole cause<sup>46</sup> of the coming-to-be and destruction of the world, from which he says that the heavens are separated off, and in general all the worlds, being *apeirous*<sup>47</sup>. He declared that destruction, and much earlier coming-to-be, happen from infinite ages, sine they are all occurring in cycles.” (Pseudo-Plutarch, *Stromateis* 2 = DK12 A10 = KRS 101C)

The three preceding citations are different versions of Theophrastus’ account of Anaximander’s primary substance. According to Kahn the version of Simplicius’ “can be treated as largely identical with that of Theophrastus” (1994:33). As we can see, the three versions differ somewhat, and even though the account of Simplicius’ seems to be the original from which the two others have been developed, the latter contain information that the account of Simplicius does not. Therefore we can not simply overlook these as later and lesser versions of the same text. Naturally, the different versions of Anaximander’s sayings are subject to debate; what text, if and when the different texts differ from each other, is the more correct one? Every interpretation of Anaximander provides some reason for that’s preferred textual basis to be the more correct one, lack of space prevents further inquiry into this.

Most scholars on Anaximander interpret that Theophrastus said that Anaximander was the first to have used ἀρχή as a special term for the original substance, though a different interpretation suggests that Anaximander was the first to call the material principle, ἀρχή, by the name τό ἄπειρον. This certainly looks most fitting to the extract from Theophrastus by Simplicius above. KRS carefully agrees with this interpretation and states that Theophrastus implied no technical use of ἀρχή to Anaximander, rather the term he referred to was τό ἄπειρον.

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<sup>45</sup> Or ‘some certain unlimited nature’, φύσιν τινά τοῦ ἀπείρου

<sup>46</sup> τὴν πᾶσαν αἰτίαν ἔχειν

<sup>47</sup> ‘innumerable’

Anaximander rejected the idea that water or any other primary body or element could be the originaive basis of all other worldly material. Thus he invented an ultimate primal substance; its only characteristic would be that it had no limits. The term ἄπειρον derives from the negating α in front of περας meaning *limit* or *boundary*; thus ἄπειρον means ‘unlimited’ or ‘without boundaries’.

The reasons Anaximander claimed the existence of an ἄπειρον, an Unlimited substance, are reported as follows:

“But the others say that the opposites are separated out from the One, being present in it, as Anaximander says and all who say there are one and many, like Empedocles and Anaxagoras; for these, too, separate out the rest from the mixture” (Aristotle, *Physics* I.5, 187a12)

“But yet, nor can the infinite body be one and simple, whether it be, as some say, that which is beside the elements, from which they generate the elements, or whether it be expressed simply. For there are some people who make what is beside the elements the infinite, and not air or water, so that the rest be not destroyed by their infinite substance; for the elements are opposed to each other (for example, air is cold, water moist, and fire hot), and if one of those were infinite the rest would already have been destroyed. But, as it is, they say that the infinite is different from these, and that they come into being from it.” (Aristotle, *Physics* III.5, 204b22 = KRS 105)

“Belief in infinity would result, for those who consider the matter, for the most part from five factors... further, because only so would generation and destruction not fail, if there were an infinite source from which that which is coming-to-be is derived.” (Aristotle, *Physics* III.4, 203b15 = KRS 106)

“Nor, in order that generation may not fail, is it necessary for perceptible body to be *actually* infinite: for it is possible for the destruction of one thing to be the generation of the other, the sum of things being limited.” (Aristotle, *Physics* III.8, 208a8 = KRS 107)

“...of the infinite there is no beginning... but this seems to be the beginning of the other things, and to enfold all things and steer all, as all those say who do not postulate other causes, such as mind or love, above and beyond the infinite. And this is the divine; for it is immortal and indestructible, as Anaximander says and most of the physical speculators.” (Aristotle, *Physics* III.4, 203b7 = KRS 108)

“For some posits one substance only, and this some posit as water, some as air, some as fire, some as finer than water and thicker than air; which they say surrounds all the heavens, being infinite.” (Aristotle, *de Caelo* III.5, 303b10 = KRS 109)

Aristotle gives two apparently contradictory accounts of Anaximander’s principle: that it is a single body apart from the elements (Aristotle, *Physics* III.5, 204b22 = KRS 105), and that it is a mixture like the mixture of Empedocles (Aristotle, *Physics* I.5, 187a12). Also, there is the implication in (Aristotle, *Physics* III.4, 203b7 = KRS 108) that Anaximander did not postulate teleology, as he did not postulate other causes besides the physical, causes that could ensure



some universal goal. This implication could be interpreted as contradictory to the claim that the *aperion* is ‘divine’, and that it ‘steers all’, as if it is some form of divine mind.

These apparent contradictions will be resolved and explained later in the essay.

### 3.2.2 On eternal motion

“...motion was eternal, in which it results that the heavens come into being” (Hippolytus, *Refutation*, 1.6.2 = KRS 115)

“Did motion come into being at some time (...) or did it neither come-to-be nor is it destroyed, but did it always exist and will it go on for ever, and is it immortal and unceasing for existing things, being like a kind of life for all natural objects? (...) But all who say that there are infinite worlds, and that some of them are coming-to-be and others passing away, say that motion always exists (...) while all who say that there is one world, whether eternal or not, make an analogous supposition about motion.” (Aristotle *Physics* VIII.1, 250b11 = KRS 116)

“Yet indeed there is some kind of natural motion, there would not be enforced motion only, or enforced rest; so that if the earth now stays in place by force, it also came together to the centre by being carried there because of the vortex. (For this is the cause that everyone gives, through what happens in water and in air; for in these the larger and heavier objects are always carried toward the centre of the vortex.) Therefore all who generate the heaven say that the earth came together to the centre.” (Aristotle *De caelo*, II.13, 295a7 = KRS 117)

Evidently, because Anaximander and Anaximenes did not specify anything that obviously could act as a cause of change, Theophrastus attributed ‘eternal motion’ to them. Aristotle seems to better understand Anaximander, and interpret that change in the cosmos was connected to the divinity and power over life and movement of the Unlimited. KRS (2004:127-128) assumes that Theophrastus has in mind some mechanical kind of ‘eternal motion’ like that of the atomists, and that he for this reason might have attributed multiple worlds to Anaximander as well. KRS find it highly improbable that Anaximander himself isolated the question of motion, as the Unlimited was ‘divine’ and possessed power to move at will. KRS further (*ibid.*): “One often reads of a vortex or vortices in Anaximander. There is in fact no evidence for this apart from Aristotle in KRS 117, a highly involved piece of *a priori* reasoning.”

This above reasoning places Anaximander close to the *aitia* of ‘personal guilt’ and more distant to the *aitia* of ‘causality’; if the Unlimited is free to act at will and whim there is certainly a notion of ‘responsibility’ involved when the Unlimited chooses to do so. To state some creative mechanism would be to place Anaximander more in the modern direction; the causal relata would then be natural phenomena acting by natural law, and being productive of the result in the same way a guilty person is productive of that which has gone wrong (to

paraphrase Frede 1987), but the ‘guilt’ would then be a metaphor only, and not really implying that anybody (or anything) is *guilty* of the situation: we would rather say that this something *caused* the situation.

It is my intention to show that Anaximander did not intend for the Unlimited to be understood as a living and reasoning living being which chooses to act, freely and willingly. Rather, it is a physical entity (albeit a unique one) subject to laws of nature.

### 3.2.3 Position and shape of the earth

Anaximander stated that the earth is at rest because of it being perfectly balanced in the middle of the universe, ‘in equilibrium’; it is equally distant to all points in the surrounding environment. Thus it has no reason to move either this way or that. This is how Hippolytus and Aristotle represent Anaximander’s view:

“The earth remains aloft, unsupported by anything<sup>48</sup>, because of its equidistance from everything” (Hippolytus, *Refutation* 1.6.3 = DK12 A11 = KRS 124)

“There are some who say that the earth remains in place because of similarity<sup>49</sup>, as did Anaximander among the ancients; for a thing established in the middle, with a similar relationship to the extremes, has no reason to move up or down or laterally; but since it cannot proceed in opposite directions at the same time, it will necessarily remain where it is.” (Aristotle, *De Caelo* B.13, 295b11-16 = DK12 A26 = KRS 123)

Aristotle shows how ingenious Anaximander was when he explained why the earth was at rest. There are several interesting points about this statement: First, as pointed out by Kahn (1994:77) the mathematical knowledge implied by it. This statement must presuppose that the standard definition of a circle is “that which is in every way equidistant from the middle to the extremes”<sup>50</sup>. But this is only presupposed if, as Kahn believes, Anaximander envisioned the earth as surrounded by a sphere. This seems like a well-founded interpretation of ‘being in the middle, with a similar relationship to the extremes’. There is however the statement by Anaximander that the earth is like a stone column; its shape is like a cylinder with a flat surface:

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<sup>48</sup> In other translations ‘not dominated by anything’ (Kahn); ‘held up by nothing’ (KRS); ‘overpowered by nothing’ (Barnes); originally κρατουμένην from κρᾶτέω; *to be strong, to rule, become master of, ruler over, conquer, subdue, be superior over, hold fast, to order, command* (LS)

<sup>49</sup> Or ‘symmetry’; originally ὁμοιότητα, from ὁμοίως; *in like manner, like, alike* (LS). This term is also translated ‘equilibrium’ (KRS) and ‘indifference’ (Guthrie).

<sup>50</sup> The interpretation of a mathematical argument to the cosmological question Algra (1999:55) does not agree with; the ‘equilibrium’ of the argument does not have to be an equilibrium conceived of in purely mathematical terms. Elsewhere in Anaximander ‘equilibrium’ implies balance between the opposites, Algra argues.

“Its form is cylindrical, with a depth one third of its width” (Pseudo-Plutarch, *Stromatesis* 2 = DK12 A10 = 122A).

“Its shape is curved, round, similar to a drum of a column; of its flat surfaces we walk on one, and the other is on the opposite side” (Hippolytus, *Refutation* 1.6.3 = DK12 A11 = KRS 122B).

Now, this is either a minor mistake by Anaximander, him failing to acknowledge that a cylinder could not be equidistant from all surrounding points if surrounded by a sphere, or he actually envisioned the surrounding elements as cylindrical, mirroring the shape of the earth. It appears that the former explanation is preferred among the scholars on Anaximander<sup>51</sup>. There is also the fragment of Pseudo-Plutarch (*Stromateis* 2 = KRS 121 = DK12 A10) which states that at the creation of this world “a sphere (σφαῖραν) of flame (...) was formed round the air surrounding the earth” which shows that Anaximander in fact described the earth at *one point*, at least, as surrounded by a sphere. There is also the use of the word κύκλος, meaning *circle*, *ring*, to describe several other phenomena of the heavens, as the heavenly bodies in reality are circles of fire and air<sup>52</sup>. The picture of the earth as a sphere within a spherical surrounding universe emerges in Plato’s *Phaedo*, thus making the symmetry of the Earth and the universe more complete:

“I am therefore persuaded that, in the first place, since the earth is round and in the middle of the heaven, it has no need either of Air or of any other Necessity on order not to fall, but the similarity of the heaven to itself in every way and the equilibrium of the earth suffice to hold it still” (Plato, *Phaedo* 108e-109a).

If we allow Anaximander to construct an element surrounding the earth that is cylindrical, the symmetry that he aspires to almost every point of his cosmology is succeeded, at least more so than in the case of a cylinder inside a sphere. But this rings untrue to a universe ‘similar to itself’, all points of the earth’s surface could be equally distant to its surroundings but its centre would be highly off-balanced. The natural equality and balance of the circle seems the more likely explanatory model for a Presocratic cosmologist. Rather than making every point on the earth’s surface equidistant from its surroundings, then, Anaximander made the *centre* of the earth equidistant, i.e. equidistant from all surrounding points of the spherical inner

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<sup>51</sup> Kahn (1994:92) quotes Diels in ascribing to Anaximander “the first, if still imperfect, indication of the theory of geocentric spheres which dominated the astronomy of antiquity and of the middle ages.”

<sup>52</sup> cf. KRS 126, 127, 128

surface of the universe. This is the standard way of interpreting Anaximander's thesis of the earth's stability<sup>53</sup>.

Secondly, Anaximander disqualifies the problem stated by Thales when he answered his own question 'why does the earth not fall?' by citing that the earth rested on water. Anaximander understood that there was no reason the earth should fall at all, if the universe was symmetrical. The disqualification of the problem of earth's stability and the solution offered are truly ingenious inventions by Anaximander. The disqualification of the common sense-supported idea that all bodies fall downwards, in the direction we know as 'down', that is, towards the centre of the earth, is unparalleled at least until fully developed atomism emerges. Even the atomist Epicurus said that the natural behaviour of the atoms is to fall "downwards".

The explanation of as to why the earth is at rest seems to be supported by a notion very similar to Leibniz' *Principle of Sufficient Reason*: Everything which is true or real implies a reason why it is so and not otherwise, as this principle is formulated by Kahn (1997:77). If there is no sufficient reason for anything to happen, we need not explain why it did not.<sup>54</sup> The use of the Principle dictates that every event has an explanation and a reason, thus indicating that Anaximander has in fact discovered that *all things have causes*. It is tempting to conclude so, but it seems premature. For Anaximander does not say that all things must have causes, just the earth and its stability. Second, we do not know how much is Aristotle and how much is Anaximander in this explanation. I will return to these questions in part 3.5.1 *The Principle of Sufficient Reason*.

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<sup>53</sup> KRS gives a slightly diverging interpretation when they claim that the earth is in equidistance to the *rings of the heavenly bodies* (2004:134), and not equidistant to the inner ring of the surrounding universe, or to the Unlimited itself. This interpretation I cannot agree with; while Simplicius wants the earth to be equidistant to "all things", thus supporting the interpretation of KRS', Aristotle says that it is "equally related to the extremes" and these are not the heavenly rings, but rather the extremities of the surrounding circle, i.e. every point of the circle. The idea that earth is balanced between heavenly bodies seems to me too closely related to ideas of 'gravitational pull' or some other notion of cosmic bodies having the power to draw other cosmic bodies to themselves. There is no reason to assume Anaximander held any such notions.

<sup>54</sup> This principle is later used by the Atomists, using the explanatory rule of *ou mallon*, 'no more', as a means to claim sceptical indifference to an issue: some say *p*, some say not-*p*, hence there is *ou mallon* reason to chose *p* rather than not-*p*. Democritus used the slogan-like rule to express support for the Atomistic ban on certain perceptual properties in objects; as opinions on sense-perception differs, the object is neither this nor that, according to the rule of *ou mallon* (Hankinson 1998:209-211).

### 3.2.4 Meteorological phenomena

In the following texts Anaximander explains some of the meteorological phenomena, and in doing so, he applies apparent *reductive principles*; explanations of several phenomena by referring them to fewer, simpler phenomena.

“Winds occur when (ὄταν)<sup>55</sup> the finest vapours of the air are separated off (ἀποκρινομένων) and when they are set in motion by congregation; rain occurs from the exhalation that issues upwards from the things beneath the sun, and lightning whenever wind breaks out and cleaves the clouds.” (Hippolytus, *Refutation* 1.6.7 = KRS 129)

“(On thunder, lightning, thunderbolts, whirlwinds and typhoons.) Anaximander says that all these things occur as a result of wind: for whenever (ὄταν) it is shut up in a thick cloud and then bursts out forcibly, through its fineness and lightness, then the bursting makes the noise, while the rift against the blackness of the cloud makes the flash.” (Aëtius III.3.1-2 = KRS 130)

“For first of all the whole area round the earth is moist, but being dried by the sun the part that is exhaled makes winds and turnings of the sun and moon, they say, while that which is left is sea; therefore they think that the sea is actually becoming less through being dried up, and that some time it will end up by all being dry (...) of this opinion, as Theophrastus relates, were Anaximander and Diogenes.” (Aristotle, *Meteorologica*, II.1, 353b6 = KRS 132)

In Hippolytus the vapours or ‘exhalation’ are somehow viewed as to be causing rain, though the specifics of generating rain are not mentioned. Kahn (1994:100) interprets the meaning to be that when the finest vapours are absent from the air (because they have vaporized), what is left is heavy, thick cloud, moist with potential raindrops.

In the text by Aëtius (KRS 130) “the rift against the blackness of the cloud makes the flash”; now this either means that as the wind trapped inside the cloud shoots out it literally turns into fire (as says Kahn 1994:102) or, I suggest, that the concentrated air (“its fineness and lightness”) *appears* as brighter and flame-like against the darkness of its background surroundings. This has clear parallels to how Anaximander explains the heavenly bodies, that is, our *conception* of the heavenly bodies. Though we see e.g. the moon as a bright disk in the sky, periodically eclipsed, it is in reality a great circle of fire surrounded by a circle of air. Though this explanation of lightning seems less suited to explain what happens when lightning strikes ground and sets things on fire, the forces of the concentrated wind alone would at least count for the destruction that a lightning-strike causes. Still, it is interesting that Anaximander possibly explained a meteorological phenomenon in a similar matter to cosmological phenomena; by arguing that there is a discrepancy between the things as they are and how we perceive them. The ‘naivety’ of the Milesians is maybe not so naïve after all.

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<sup>55</sup> Meaning *whenever*, with a conditional force, also of events likely to happen (LS).

### 3.2.5 The origins of animals and of humans

“Anaximander said that the first living creatures were born in moisture, enclosed in thorny barks; and that as their age increased they came forth on to the drier part and, when the bark had broken off, they lived a different kind of life for a short time.” (Aëtius V.19.4 = KRS 133)

“Further he says that in the beginning man was born from creatures of a different kind; because other creatures are soon self-supporting, but man alone needs prolonged nursing. For this reason he would not have survived if this had been his original form.” (Pseudo-Plutarch, *Stromateis* 2 = KRS 134)

“Anaximander of Miletus conceived that there arose from heated water and earth either fish or creatures very like fish; in these man grew, in the form of embryos retained within until puberty; then at last the fish-like creatures burst and men and women who were already able to nourish themselves stepped forth.” (Censorinus *de die nat.* 4.7 = KRS 135)

“Living creatures came into being from moisture evaporated by the sun. Man was originally similar to another creature – that is, to a fish” (Hippolytus, *Refutation* 1.6.6 = KRS 136)

Anaximander’s is the first attempt of which we know to explain the origin of man, as well as the world in entirety, rationally. Moreover the general principles of the development of birth are similar: moisture is contained in a bark-like covering, and heat somehow causes an expansion or explosion of the husk followed by the release of a completed form within.

### 3.3 Multiple worlds

I will in the following examine the evidence and interpretations concerning Anaximander’s thesis of *multiple worlds*. These are, if they are indeed intended by Anaximander, physical worlds which are generated and destroyed again throughout our universe (temporally or spatially). Clearly, methodical statement concerning creation and destruction will exhibit, if only implicitly, some idea of causality and causal structure. Methodical statements on the creation and destruction of the known cosmos are therefore pertinent to the present theme. The question raised is whether or not Anaximander claimed multiple worlds, and if he did so, what sort of multiple worlds?

Anaximander’s texts can be subject to many interpretations several of whom are contradicting not only each other, but often also themselves, should they show consideration to all doxographical information on Anaximander<sup>56</sup>. The long and yet inconclusive debate on Anaximander’s innumerable worlds started with the doxographers that claimed that

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<sup>56</sup> An example of this internal contradiction is found in the theory of justice in Anaximander suggested by Vlastos (1947).

Anaximander advocated innumerable worlds of some kind (*apeiroi kosmoi*, or *apeiroi ouranoi*, or both). According to Simplicius, Theophrastus ascribed to Anaximander the existence of multiple worlds, as we observe from the use of plural form in the comments to the extant fragment:

“...some substance of infinite spatial extent, from which come into being all the heavens and the worlds in them (τοὺς οὐρανὸς καὶ ἐν αὐτοῖς κόσμους)” (Simplicius, *Physics* 24.13 = KRS 101A = DK12 A9)

We can interpret the extant fragment as arguing that the world has its originating principle and material ground in the Unlimited, and so will also return to this formless, non-defined primeval state after its destruction. The Unlimited is eternal, and will thus create worlds eternally. It is clear that Aëtius read Theophrastus so:

“Anaximander of Miletus, son of Praxiades, says that the first principle of existing things is the Boundless; for from this all come into being and into it all perish. Wherefore innumerable worlds are both brought to birth and again dissolved into that out of which they came” (Aëtius, *Placita* I.3.3 = DK12 A14)

Against this, Zeller<sup>57</sup> argued that the multiple worlds of Anaximander were not coexistent, but successive. Burnet<sup>58</sup> argued against this and claimed coexistence. Cornford (1934), then, revived some of the arguments of Zeller and disproved many of the statements by Burnet, thus again claiming successive worlds for Anaximander. From this Kirk (1955, subsequently KRS 2004) and later Kahn (1994) claimed that there were neither successive nor coexistent worlds in Anaximander’s theory of the universe. This claim has found support in Guthrie (1977) and many others. Dancy (1989), Finkelberg (1999) and Hankinson (1998) are advocates of the interpretation that Anaximander claimed multiple successive worlds. To the modern reader of Anaximander, then, the question of multiple worlds is a question of whether the worlds are successive or if there is a mistake altogether to ascribe any sorts of multiple worlds to Anaximander. We will start the evaluation of evidence with the most important piece of information on Anaximander; the extant fragment.

As the extant fragment of Anaximander does not mention innumerable or multiple worlds (as we will see), we are dependent on doxographical reports on this subject. The doxography on Anaximander’s multiple worlds are as follows<sup>59</sup>:

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<sup>57</sup> Zeller, Edward, 1923. *Die Philosophie der Griechen*, I, 1, Leipzig.

<sup>58</sup> Burnet, John, 1945. *Early Greek Philosophy*, London.

<sup>59</sup> From Kahn (1994:185 note 3); Guthrie (1977:107-110); Finkelberg (1994:485, 490).

Aëtius *ap. Stob* I.7.12; II.1.3; II.1.8; II.4.6. (DK12 A17)  
Aëtius *Placita* 1.3.3 (DK 12 A14)  
Simplicius, *De caelo* 615.15 (DK12 A17)  
Simplicius, *De caelo* 202.14 (not in DK)  
Simplicius *Physics* 1121.5 (DK12 A17)  
Simplicius *Physics* 24.13 (DK12 A9)  
Simplicius *Physics* 41.17 (not in DK)  
Augustine *Civ. Dei* VIII. 2 (DK 12A17)  
Hippolytus *Refutation of all heresies* (1.6.1-2 = DK 12 A11)  
Pseudo-Plutarch *Stromateis* 2 (DK12 A10)  
Cicero *De Natura Deorum* 1.10.25 (DK12 A17)

All of these will not be cited and thus not commented upon, due to lack of space. The most important fragments will however be discussed.

### 3.3.1 The extant fragment of Anaximander

“He [Anaximander] says that it [the material principle of existing things] is neither water nor any other of the so-called elements, but some substance of infinite spatial extent<sup>60</sup>, from which come into being all the heavens and the worlds in them. And the source of coming-to-be for existing things is that into which destruction, too, happens, ‘according to necessity; for they pay penalty and retribution to each other for their injustice according to the assessment of Time’, as he describes it in these rather poetical terms.” (Simplicius, *Physics* 24, 13 = KRS 101A; 110 = DK12 A9; B1)

κατὰ τὸ χρεῶν · διδόναι γάρ αὐτὰ δίκην καὶ τίσιν ἀλλήλοις τῆς ἀδικίας κατὰ τὴν τοῦ χρόνου τάξιν (KRS 101A; 110 = DK12 B1)

The part of the testimony above represented in inverted commas (and repeated in Greek) is considered to be the only legitimate extant fragment from Anaximander’s book; the context of the fragment tells us that this was Anaximander’s own phrasing. Simplicius thus must have had access to a part of Theophrastus’ writing where Anaximander was quoted directly. But we do not know whether Simplicius actually had seen writings by Theophrastus, or if he had access to them through Alexander’s commentary on the *Physics*. Nor do we know what version, if any, of Theophrastus’ report on Anaximander Simplicius had access to. And to complicate things further, we can not, based on the assumption that Theophrastus quoted one original sentence of Anaximander’s, conclude that Theophrastus had studied Anaximander’s *On Nature* in its completeness.

These reservations mean that while the fragment is legitimately Anaximander’s own phrasing, those that reported on it can still misinterpret it. This explanatory strategy has been

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<sup>60</sup> Or ‘some *apeiron* nature’.



chosen by KRS, who hold that Theophrastus misinterprets Anaximander when reporting on his multiple worlds. Other critiques of the multiple worlds-interpretation of Anaximander, like Kahn and Guthrie, are more prone to blame the later doxographers for misrepresenting Anaximander's view on the plural κόσμοι within the plural οὐρανοί.

The interpretations of the extant fragment are, to put it somewhat pointedly, as numerable as there are papers and books on Anaximander. The interpretation best representing what can be considered the standard view<sup>61</sup>, however, is this:

The context show that Theophrastus assumed the quotation to be some form of support for or having relevance to the view he immediately before had ascribed to Anaximander. The view is that of multiple worlds coming from the Unlimited, and, since Anaximander says that things return to that from which they came upon their destruction, this is being interpreted as stating that the multiple worlds come from, and eventually will return to, the Unlimited. The explanation for this is Anaximander's 'poetical' picture of things paying penalty and retribution to each other for injustices committed, a principle of balance between forces. Further, this happens unavoidably and necessary, not immediately, but when the time is right: "according to the assessment of Time".

At this point objections towards Theophrastus' representation of Anaximander are made. For Theophrastus speaks of 'multiple worlds', ἄπτεροι κόσμοι, which is in 'the standard view' considered incorrect. The main argument from the extant fragment is that retribution is committed mutually, ἀλλήλοις, between the multiple (as we see from 'ἐξ ὧν... εἰς αὐτὰ') parties upon which their injustice is committed. It is therefore considered unlikely that it is the Unlimited that commits injustice upon its own products, mainly because "the things which commit injustice on each other must be equals, different but correlative" (KRS 2004:119). What, then, are these things that are multiple, equal, and that can commit injustice upon each other? The conclusion is standardly 'the opposites'; "the opposed substances which make up the differentiated world" (*ibid.*).

The opposition between natural substances and powers of nature and their interchange (summer turns to winter which turns to summer again) are, then, explained by Anaximander in a legalistic metaphor originated in the sphere of human affairs. When one substance (or power or attribute) gains upon another, i.e. grows at the other's expense, it commits 'injustice'. This injustice will then be settled by the offended substance gaining upon the other

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<sup>61</sup> Corresponding, with minor variations, to those of KRS, Kahn, Guthrie, Barnes, and Algra.

again some time later; this is then ‘justice’. The opposed powers of nature are constantly committing injustices upon each other in an endless interplay within a balanced whole. In this manner “both the continuity and the stability of natural change were motivated for Anaximander” (KRS 2004:120). This represents a radical break with the idea of worlds coming-to-be and being destroyed because their existence in some way is unjust, assumingly towards the Unlimited; rather, the world is created by the Unlimited and then continues ever or, in some near-perfect harmony, maintained by internal balancing forces.

The metaphor of ‘injustice’ is considered to be elaborated upon by the phrase “according to the assessment of Time”. Injustice must inevitably be compensated. Time is assumed to control not the amount of punishment, but the time-limit for the payment<sup>62</sup>. That time-limit is not a set size but something that has to be measured out case by case; the heat of summer must be compensated for by winter-time, and the light of day compensated for by night-time, but also the length of the compensation is settled by Time: summer is roughly equal to winter in length, day is roughly equal to night in length<sup>63</sup>.

The sentence immediately before the extant fragment, “And the source of coming-to-be for existing things is that into which destruction, too, happens” is interpreted by KRS (2004:121-122) as a paraphrase of Anaximander by Theophrastus, expressing the idea that opposites pay recompense to their particular opposites and to no other (e.g. the wet compensating the dry, the warm compensating the cold etc.). This principle is necessary in order for KRS’ theory on Anaximander’s cosmic stability to hold, and even though it looks obvious to us it probably was not as obvious in ancient times, since Heraclitus emphasizes it in his writings<sup>64</sup>. Guthrie (1977) agrees with this reasoning and states that whether the preceding sentence is Anaximander’s original or a paraphrase by Theophrastus or Simplicius, it cannot refer to the primal generation of the opposites from, and final reabsorption into, the ultimate *apeiron*, “but only to their mutual transformation in the present order. Otherwise its connexion with the quotation which follows would make no sense.” (1977:81)

Vlastos (1947) presents another interpretation of the extant fragment. He, too, takes argument with the ‘older interpretation’ of the fragment (where the existence of the cosmos is in itself an injustice towards the Unlimited). The fact that the fragment refers *in the plural* to that

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<sup>62</sup> KRS (2004:121)

<sup>63</sup> Or more complex: as the length of day and night varies throughout the year, there are periods when day far surpass night in length, which are compensated for by periods of night far surpassing day in length. Note must though be taken that this fluctuation in amount of daylight surely is more salient in the northern parts of the world (where this essay is written) than in the Mediterranean region.

<sup>64</sup> KRS (2004:122)

which all things arise from and must return to, means that the Unlimited is being thought of as a plurality, Vlastos writes. The reason for this is the interpretation of the Unlimited as a mixture of opposites: The Unlimited is a mixture of *potential* things. Thus in the Unlimited itself no power can dominate another and thus commit ‘injustice’. Only when the generative separation occurs do separate powers appear. Thereafter, when one power encroaches upon another injustice is committed, according to Vlastos (1947:172). When the world ends and is reabsorbed into the Unlimited the opposites are not destroyed; they are blended once again, re-establishing the equilibrium. This is the ‘reparation’. We then see that there is no injustice towards the Unlimited, nor reparation towards it. The opposites commit injustice and pay damages towards one another.

McDiarmid (1970) interprets the extant fragment thus: Anaximander declared that the Unlimited is the principle of all things (‘that from which things are created and into which they are destroyed’), and that the Unlimited is some body which is not water or any other so-called element, because, as he said, the elements ‘make reparation and satisfaction to each other for their injustice’ – hence none of them could ever be the elemental substratum (1970:193). Even though the thread of the argument is obscured in the doxography, it is clear that Theophrastus understood the subject of the metaphor to be the elements, and read the metaphor (‘for they pay penalty and retribution to each other for their injustice according to the assessment of Time’) as an argument for the existence of a separate Unlimited (McDiarmid 1970:194-195).

Hölscher (1970) also reads the extant fragment as expressing a law of necessary succession of becoming and decaying. But to him the context in Simplicius’ writing show what sorts of things that was subject to this law: In the sentence preceding the extant fragment the words ἐξ ὧν occurs, meaning ‘existing things’ or ‘whatever things’, and by this wording Simplicius takes up the ἐξ ἧς from the sentence preceding that again, where it refers to “all the heavens and the worlds in them”. Hence; “the sentence explains the rise of the worlds and their *kosmoi*” (1970:297).

Vegetti (1999) writes on the extant fragment: “The universal and necessary connection that binds things in the cosmic cycle conceived here in the moral/judicial terms of guilt and punishment rather than those of causal explanation” (1999:273).

I read the extant fragment to describe a universal relation; the subjects of it are (all) existing things (the lack of definite article in Greek equates ‘existing things’ with ‘the existing things (that are)’ or simply ‘all existing things’). Further, this connection is a necessary connection:

“according to necessity”. Obviously, it is expressed in moral/judicial terms (“penalty and retribution”), but I am hardly convinced that this excludes a causal explanation as such. I rather agree with McDiarmid in that the fragment does not express the relation of the world-constituting opposites to one another, but gives an explanation as to why the Unlimited could not have been one of the elements, or ‘primary bodies’. The principle of justice expressed here is opaque; it could refer to how all existing things must be destroyed and recreated, or it could just refer to the opposites or primary elements. That time assesses when retribution is to happen is clearly grasped and explained by KRS, as presented above.

### 3.3.2 On a living cosmos

Objections towards the ‘multiple successive worlds’ interpretation of Anaximander frequently<sup>65</sup> claim that the idea of the world, ο κόσμος, returning to the Unlimited upon its ultimate destruction is absurd. This is either because it supposedly does not make sense given the cultural matrix of the theory’s originator<sup>66</sup>, or because the biological model breaks down when we are to imagine how the world returns into the Unlimited upon its destruction.

But the biological model would certainly give us a clear Anaximandean picture of creation and destruction. The question “from where does a living thing, for instance a man, come?” can be answered by stating “a female egg and semen”, or, for short, biological “seed”. But this answer would make Anaximander vulnerable to the same objection that his teacher, Thales, made himself vulnerable to in the case of the earth’s stability. For one could keep asking “where does the seed come from?” and when this is answered by “his parents” one is drawn into infinite regress. Anaximander, already having identified this problem in Thales’ cosmology and having rectified it, knew that this caused an explanatory problem. So he went straight to the regress-stopper: the Unlimited. By having the Unlimited create the seed that created the world there is no regress. Applied to living things we then see that this particular man was created by the seed of his parents, and so on, but Man ultimately came from the great Unlimited. And when the time of mankind is over, it disappears into the great Unlimited again. The world’s relation to the Unlimited is like the mortal’s relation to the eternity that lies before and after life.

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<sup>65</sup> e.g. Algra (1999:57) follows the ‘standard’ interpretation of the extant fragment but leaves room to the notion of a living world with a birth and a subsequent death; however he does not find any explanation on exactly how the cosmos in its final stage, as fire or moisture, would return to the Unlimited.

<sup>66</sup> Multiple worlds, and eternity itself, is said to have been invented by the atomists, as a result of their trying to answer Parmenides’ ban on motion and plurality, cf. e.g. Guthrie (1977:113).

Further, it makes good intuitive and empirical sense to argue that while a living thing comes into life from the form of a seed, it does not return to seed-status upon, nor immediately before or after, death. Yet one can reasonably claim, if allowing the use of this spatial metaphor, that the place living things are both before and after life is the very same timeless and limitless place. One does not have to leave by the very same door by which one came into the room, even though this would make the explanatory structure neater.

Kahn (1994) writes that:

“...the κόσμος is a concrete arrangement of all things, defined not only by a spatial disposition of parts, but also by the temporal τάξις [assessment, arrangement] within which opposing powers have their turn in office. It is the spatial aspect which tends more and more to obscure the temporal order that prevailed in the earlier conception. Both ideas, however, are inextricably linked from the beginning to the end of Greek philosophy. The cosmos has not only an extended body, but also a lifetime (αἰών)<sup>67</sup>, whose phases are celestial cycles.” (1994:188-189)

The question that in the context of multiple worlds arises from the concept of the cosmos’ lifetime, is how closely related are the notion of lifetime with the notions of birth and death? This question answers itself, for is not a lifetime exactly that period of time that exists between some living things’ birth and its death? If we define the word ‘lifetime’ on basis of its biological application, then clearly yes; a lifetime is that limited period of time where one is living, in the sense that the living period is one significantly different from the period where one is not; i.e. before one is born and after one is dead. The term ‘life’, or so I think, loses its meaning without some opposite term of opposite meaning.

If we however define the word differently, not in reference to some biological model, but for instance as something similar to ψυχή, then we, like Thales, can apply the word to non-living objects such as stones. How familiar would Presocratic philosophers be to a definition of ‘life’ which was not much different to ‘non-life’? For Thales the minimum sign of life-force, ψυχή, apparently was the ability to make other bodies move, so, he inferred, the magnetic rock had ψυχή. But that does not mean or even imply that he held that rocks, magnetic or otherwise, were *alive* in some significant definition of the word, or that they had *lifetimes*.

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<sup>67</sup> While LS defines αἰών as 1) *a lifetime, a life*; 2) *infinitely long time, an eternity*, Kahn writes: “This sense of αἰών, the world’s lifetime, occurs in Aristotle’s *De Caelo* 279a22-30 and 283b28. For reasons of his own, Plato has re-defined αἰών as the timeless eternity of the Forms (...) Aristotle’s use of the word is closer to the original meaning. The etymological sense of αἰών was ‘vitality, vital force’. (...) The later sense of ‘eternity’ is due to a philosophic reinterpretation of αἰών as equivalent to ἀεὶ ὤν.” (1994:189 n.1)

Kahn further argues that to Greek thinkers all living things and natural processes are contrasted with the eternal life of divine beings<sup>68</sup>. The question that arises here is then ‘does the earth count as a living creature or a divine being?’ If the world counts as a living being, we could expect a Greek thinker apply to it both ‘becoming’ and ‘destruction’. If the world is divine, we would expect the world to have eternal life. If Anaximander believes the world to be a living creature, with birth, life and death, the thesis of him claiming multiple worlds would be strengthened. If Anaximander claims that the world is a divine being, implying that the world has eternal life, there would be little or no room for multiple worlds in Anaximander’s universe. However, clearly there *can* be multiple co-existent worlds in the universe if our world has everlasting life. Multiple other worlds could exist simultaneously with our world no matter how long this particular world existed. But this is a position which seems highly unlikely for Anaximander. I share the opinion of several<sup>69</sup> of the scholars on Anaximander: that theories of unlimited *co-existent* worlds belong to Atomism and Atomistic thought, and to ascribe this position to Anaximander is to conflate different theories of multiple worlds.

Hölscher (1970) holds that the extant fragment expresses a law of generation and destruction, into which it is tempting to interpret the alteration of day and night and summer and winter, but there are other periods one can read into it as well: “the life and death of earthly beings. Here the only alternation is between life and death or life and another life. Balance is not achieved by an equal pull of opposites, but by the fact that each has an allotted span” (1970:298). Hölscher does not believe that the opposites are balanced; “the ‘opposites’ are not eternally equal; one devours another” (*ibid.*). The injustice that brings the cycles to an end is compensated in a larger cycle which has its beginning and end in the Unlimited. Against this is the frequent claim that Anaximander was inspired by the changing seasons when formulating principle of justice; that he from watching the seasons abstracted the idea of the struggle between opposites and the balance between these over time. Again Guthrie (1977) provides a good example: “One cannot suppose this cyclic process, taking place as

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<sup>68</sup> “It is not only the individual terms of Anaximander’s proposition which are familiar to early Greek thought. The rhetorical balance of generation and corruption is itself an ancient symbol in the yearly cycle of vegetation. (...) The idea of alternate growth and waning is applied by the philosophers *not only in human life, but to all natural processes*. (...) ...there is an implicit or *express contrast with the imperishable life of divine beings*. (...) The statement of Anaximander, which describes the necessary dissolution of all generated things back into their source of birth, forms a natural link between such expressions [by natural philosophers] and the Homeric antecedents” (Kahn 1994:175-176, my emphasis).

<sup>69</sup> Those who either disagree with multiple worlds in Anaximander overall (KRS, Guthrie, Kahn), or disagree with multiple co-existent worlds in Anaximander (Zeller, Cornford, Finkelberg), usually points to the confusion of the doxographers. Aëtius is often considered the most confused and least careful in ascribing positions to earlier philosophers.

Anaximander says ‘according to assessment of time’, to be anything other than the annual alternation of the season” (1977:101). This supposedly indicates that ‘natural justice’ exclusively applies to processes in the developed world. But it is also possible, I contend, that Anaximander also watched the lives of those surrounding him, and saw that the natural cycle of birth and death also came out balanced, over time.

The Greek view of time was a circular one. For the Greeks the notion of an eternal universe that is subject to cyclical changes was a completely natural one. That one of these changes should be the end of the world and the rise of a new world was no undoubtedly a radical thought in Anaximander’s time, one that bears witness of his intellectual bravery and vision. But it is not *a priori* impossible for a sixth-century Greek thinker to imagine, and if we feel the need to discover empirical inspiration for it, Ionia was full of them: people living, dying, and being born.

Finkelberg (1994) holds that the transition of the divine material from the *arche* to the state of the manifold world is the birth of the world, not the birth of the divine material itself. The reverse transition is, then, the death of the world and not of the divine material in itself (1994:498). Hence, the divinity of the *apeiron* does not transfer to or disappear into the world, which is a living entity.

Baldry (1932) draws strong parallels between ancient embryology<sup>70</sup> and ancient cosmogony. According to the *Corpus Hippocraticum*<sup>71</sup> the generation of the foetus took place in a manner similar to this: The moist seed is separated off (ἀπόκρισις) the womb<sup>72</sup>. The womb provides it with warmth, which is used to solidify the seed. The seed then attracts cool breath from the mother’s body, with which a membrane or caul is formed around the embryo<sup>73</sup>. We see that ‘the hot’ and ‘the cold’ are here central ingredients; expressed as the internal heat and cooling breath. This has a clear parallel in ‘the seed’ (γόνιμον) of Anaximander’s cosmogony, which is separated (ἀποκριθῆναι) off the Unlimited, then generates the hot and the cold, which again surrounds the earth, making it form a layer of skin or bark around itself:

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<sup>70</sup> Which was, of course, applied without the special term identifying it as a distinct branch of science

<sup>71</sup> Particularly Περὶ φύσιος παιδίου (*On the nature of the child*), chapter 12.

<sup>72</sup> Baldry (1932:29): “ἀποκριθῆναι is, as I have shown, the usual word for the ‘separating off’ of the seed”.

<sup>73</sup> Examinations of eggs from birds provided support and further extension for the Greeks of this idea of a central heated nucleus (the yoke) surrounded by a layer of ‘nourishment’ (the egg white), which in turn was enclosed within a membrane (the shell).

“Something capable of generating Hot and Cold was separated off from the eternal in the formation of this world, and a sphere of fire from this source grew around the air about the earth like bark around a tree” (Pseudo-Plutarch, *Stromateis* 2 = KRS 121 = DK12 A10)

While the translation of Kahn (1987:85) presented above does not show it<sup>74</sup>, Baldry (1932:29) suggests to be read from the opening line τό ἐκ τοῦ αἰδίου γόνιμον θεροῦ τε καί ψυχροῦ (...) ἀποκριθῆναι a seed<sup>75</sup>, rather than the anonymous ‘something’.

Baldry (*ibid.*)<sup>76</sup> suggests that τοῦ αἰδίου does not refer, as now usually interpreted, to the Unlimited in the context “separated off from the Unlimited”; rather it means “from eternity”. So that interpretation would translate into something like “a seed for the Hot and the Cold was separated out from eternity”. While that might seem ill-fitting with the following κατὰ τὴν γένεσις τοῦδε τοῦ κόσμου; “...at the creation of this here world”, when read together they express something like “a seed for the Hot and the Cold was separated out from eternity, like it was at the creation of this here world”<sup>77</sup>. Thus we would have *individual instantiation of an eternal process*, rather than a one-time sequence of events, as implied by Kahn’s translation (and other, like KRS’<sup>78</sup>). That former interpretation is, I believe, supported by the multiple meanings of the word αἰδίου, the eternal, identical to Anaximander’s ἄρπειον; it can refer to spatial and dimensional eternity, and also, to limitless abilities and qualities. The eternal has unlimited life and unlimited ability to create, whenever the circumstances for creation are present. That creation under these circumstances should be a one-time-affair seems contrary to the very essence of ‘the eternal’.

### 3.3.3 On the conflation of theories

Every interpreter of Anaximander must decide for herself whether or not Anaximander made claims to the effect of multiple worlds. As the doxographers often represents Anaximander as an advocate of multiple worlds, the opponents of this interpretation will investigate the doxological tradition for the origins of this possible misinterpretation. They usually conclude

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<sup>74</sup> I find it interesting that Kahn uses ‘something capable of generating...’, and KRS in their translation of the same text (KRS 121) uses ‘that which is productive...’ instead of a term that would place more emphasis on the biological and embryological aspects of the word. On this, see next footnote.

<sup>75</sup> γόνιμον from γόνιμος: 1) *productive, fruitful*, 2) *of creative powers, genius*. Also note γονή: 1) *that which is begotten, offspring*, 2) *the seed*, 3) *generation, childbirth*. γόνος: 1) *offspring*, 2) *race, birth*, 3) *a begetting* (LS).

<sup>76</sup> Referring to Heidel (1912:229 n 2)

<sup>77</sup> As κατὰ often means ‘according to’, ‘following’, this seems suitable.

<sup>78</sup> “That which is productive from the eternal of hot and cold was separated off at the coming-to-be of this world...” (KRS 121)



that the language of Anaximander has been misunderstood, and that his theories have for this reason been conflated with those of the atomist<sup>79</sup>.

Now, I absolutely agree with Cornford (1934:16) that to ascribe to Anaximander the theory of Leucippus or Democritus of innumerable world-forming vortices is an anachronism that violates the whole account of the pluralist system. Surely the most important difference between the early Milesians and the atomists is the former's construction of the monist system, and the latter of the pluralist. But that does not mean that to ascribe *any* theory of innumerable worlds to Anaximander is an anachronism, or a conflation with atomism. Rather, the ascription of multiple *co-existent* worlds to Anaximander seems to be a result of conflation with the atomists. There seems to be no textual reason for ascribing such co-existent worlds to Anaximander: the Unlimited is described as where the world comes from and where the world ends up after it is destroyed, by natural reasons. The Unlimited will create a succession of worlds for as long as the Unlimited exists, which is all eternity.

The principle of “justice” in the workings of cosmos is one of the sources from which we have derived our legal language about nature<sup>80</sup>. When we speak of “natural laws” we are making claims about a regularity of nature that does not allow for exceptions, thus comparable to a man-made law<sup>81</sup>. Anaximander’s use of the term “injustice”, ἀδίκος, is an early formulation of the same view: there is a balance in nature, an order that all natural things and processes must obey<sup>82</sup>. The world is created, so it will be destroyed. The world is destroyed, so a world will be created again. This comes out as multiple *successive* worlds.

It is often argued that the notion of ‘justice’ in nature *either* must mean the existence of successive worlds *or* refers to the processes that underlie nature; what sustains nature and natural processes. Guthrie (1977:111-112) will make for us a fine example of this position:

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<sup>79</sup> Kahn, Guthrie and KRS are all making claims to this effect.

<sup>80</sup> “What is new in Anaximander’s doctrine is neither the concern for seasonal repetition, nor the application of moral and legal concepts to the natural world (...) The earliest civilizations had no notion of the distinction between Nature and Society which has become habitual to us (...) Such ancient conceptions show that it is not the assimilation of Nature and Society which philosophy was called upon to establish, but rather their separation from one another (...) It was then easy and natural for Anaximander to transfer terms like δίκη, τίσις and τάξις from their social usage to a description of that larger community which includes not only man and living things on earth, but the heavenly bodies and the elemental powers as well.” (Kahn 1994:191-193)

<sup>81</sup> What a “law of nature” exactly is, is not a given; see Psillos 2002, part II. But I do not presuppose any position in that discussion; merely make the observation that we indeed use the word “law” when describing natural phenomena.

<sup>82</sup> Lloyd (1987:32): “Now the origins of the idea that *all* natural phenomena are law-like are, fairly evidently, to be sought (...) in the Presocratic philosophers, particularly in the group whom Aristotle calls the φυσιολόγοι, ‘the inquirers into nature’”. This I interpret as evidential of that the tradition of describing natural order by judicial language, categorizing natural development in judicial concepts, has its *formalization* in the earliest group of philosophers, the Milesians, and particularly in Anaximander.

“His [Anaximander’s] statement that things perish into that out of which they come, because they must make just recompense to one another, seems rather to describe the cyclic, seasonal rhythm that goes to the maintenance of a single cosmos, not the reabsorption of the separated contents of a cosmos back into the primal *apeiron*”. But in virtue of Anaximander being an early scientific thinker, it is possible that he in this was applying a reductive model of sorts<sup>83</sup>. As seen in the case of meteorological explanations, Anaximander would describe several phenomena of complex nature by reference to a smaller number of more simple processes (e.g. that of ‘separating off’) or substances (e.g. that of ‘vapour’). Algra (1999) accentuates the reductive approach of Anaximander’ explanation: “Various states of the cosmogony, including the account of the generation of living beings, as well as some phenomena in the world as it presently is, are explained by reference to the interaction of only two factors (the hot and the cold), which have separated off right at the beginning from the boundless origin of everything” (1999:48). Another example of Anaximander using reductive thinking is the biological model for explaining the creation of the universe, including the bark or skin (φλοιός) surrounding both the celestial bodies and the early fish-borne humans<sup>84</sup>. It is therefore no tenable reason to exclude the idea that the notion of cosmic justice (whether this notion is poetically meant or not) is meant to be a reductive principle, underlying all processes in nature, small and big. The same principle and processes that sustain the world can sustain several worlds, even if this means the cyclical destruction and creation of these worlds.

### 3.3.4 On the opposites

“But the others say that the opposites (τάς ἐναντιότητας<sup>85</sup>) are separated out from the One, being present in it, as Anaximander says and all who say there are one and many, like Empedocles and Anaxagoras; for these, too, separate out the rest from the mixture” (Aristotle, *Physics* I.4, 187a20 = KRS 118)

“It is clear that he [Anaximander], seeing the changing of the four elements into each other, thought it right to make none of these the substratum, but something else beside these; and he produces coming-

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<sup>83</sup> While naming Anaximander a ‘scientific thinker’ might be too bold, he is at possibly better described as a pre-scientific rationalist laying the foundations of what would become early philosophy, how we may name him is not at issue. What is at issue is the claim is that the true scientific method is *reductionism*; other ways of describing the divide between scientific and non-scientific thinking is applying the terms ‘naturalism’, ‘simplicity’, ‘explanation’, ‘reason’ (Hankinson 1998:3-4), all of which I find to quickly become circular or almost tautological (e.g. the definition of ‘naturalism’ is ‘explanation by natural causes’).

<sup>84</sup> We also know that Thales, his predecessor, used reductive principles in making water the first principle, (the physical basis of everything physical) and also the base upon which the world rests.

<sup>85</sup> The term ἐνάντιος signifies *opposition, hostility, to face something in a fight, the reverse of something* (LS).

to-be not through the alteration of the element, but by the separation off of the opposites (τῶν ἐναντίων) through the eternal motion” (Simplicius, *Physics* 24, 21 = DK12 A9 = KRS 119)

The idea of opposing forces in nature marks its ancient presence in Greek thought. The idea that nature at core consists of opposing forces, that there is a dynamic and a balance between rudimentary aspects of nature, is present in almost innumerable texts and thoughts from this culture. The universe is in Parmenides<sup>86</sup>, Empedocles<sup>87</sup> conceived of as a balanced relationship, a contract even, between opposing forces; but also in Heraclitus<sup>88</sup> as in a state of constant struggle, aggression, or strife. This notion of opposing forces of the cosmos’ was to be developed into Empedocles’ theory of the four “roots”; earth, water, air and fire<sup>89</sup>. That theory of “roots” is the historically first clear statement of the notion of an “element”, a simple substance into which other substances, or things, can be reduced or analysed. The theory of “the elements” was further developed and systemized in Plato and Aristotle, and followed by a long-lasting influence in European thought, through the Middle Ages and up until the seventeenth century.

Guthrie (1977:80-81) makes the claim that according to Anaximander the opposites are being turned into each other, so when Anaximander says that ‘things perish into those things out of which they have their being, according to necessity’, he is speaking of the opposites’ relation towards each other. Hence the extant fragment does not read into a succession of world systems, but rather into the processes that are sustaining the world. This interpretation depends on the, or so I believe, highly contra-intuitive thought that fire can come from water, that cold can be generated from warmth, that the wet is a result of the dry. Guthrie argues that there is a sense in which water can and does give birth to its fiery opposite. It was, he says (1977:80), a common Greek belief that the fiery heat at the circumference of the universe not only vaporized the moisture of the earth and sea, thus turning water and earth into mist or air, but also finally ignited it and transformed it into fire. This process was actually spoken of as the ‘nourishment’ (τρέφεται)<sup>90</sup> of the sun by water or moisture, and moisture was to the Greeks the nutritive element *par excellence*. Guthrie (*ibid*) writes that Anaximander must have noticed that it is the natural tendency of each of the elements to swallow its opposite, and this can be described as the conversion of water into fire or *vice versa*.

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<sup>86</sup> KRS 302; 303

<sup>87</sup> KRS 346; 347; 348

<sup>88</sup> Fragments 60, 61, 88, 111 = KRS 199, 200, 201, 202

<sup>89</sup> KRS 346

<sup>90</sup> From τρέφω; 1) to become firm, 2) to nourish, feed, make to grow or increase (LS)

The problem as I see with this solution is that it only explains how water can become or nourish fire – it does not say anything about generation in the other direction. So when Guthrie speaks of ‘water into fire or vice versa’, he leaves unexplained the latter half of the balancing process<sup>91</sup>. Without it, water would ceaselessly become fire and our world would quickly become a desert, then vapour, then nothing but fire. This is in fact the very reason Simplicius following Aristotle ascribed the theory of the ἄπειρον as the ἀρχή to Anaximander; as the domination of one of the elements would ensure the destruction of all others:

“Some thinkers make this [a substance from which the elements have evolved] the unlimited, not air or water, to prevent their destruction by that one of them which is unlimited; for they are marked by mutual opposition –e.g. air is cold, water wet, fire hot – so that if one of them were unlimited, the others would have perished.” (Aristotle, *Phys* III.5, 204b24)

“It is clear that, having observed the change of the four elements into one another, he did not think fit to make any one of these the material substratum, but something else besides these” (Simplicius, *Physics* 1.2.24.17 = DK12 A9 = KRS 119)

Again the parallel between Anaximander’s fragment and seasonal change is drawn: “This alternate advance and retreat of the hot and the dry, the cold and the wet, is an obvious expression of the annual variation of the season” (Guthrie 1977:80).

I find this all to run by a bit too smoothly. If one accepts that fire and water are opposites and eternal opposing forces, too the degree that if one of them had hegemony the other would be eternally exterminated, then how is this reconciled with the notion that water gives birth to and nourishes fire<sup>92</sup>? The Unlimited is described as source of both destruction and generation, the individual opposites are not.

Here I lend support from Aristotle in *De Anima*. In a passage discussing food and nutrition, Aristotle writes

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<sup>91</sup> Earlier Guthrie wrote: “The conflict of the opposites is an undeniable fact of nature. Water for instance, whose nature it is to quench fire whenever it meets it, can hardly be the original substance out of which fire, along with all the other forms of material existence, had its being” (1977:79-80). Yet Guthrie wants to make room for the idea that water also can give birth to its opposite, fire.

<sup>92</sup> The idea of the opposites being each other’s nourishment, feeding off each other and being the source of each others coming-to-be, seems to undermine the entire idea of *opposites as such*; locked in eternal struggle, committing injustice towards each other and paying penalty and retribution for these injustices. In e.g. the case of water nourishing fire, if water grows, fire will also grow. And if fire grows, as it is water’s opposite, water will diminish. But as the opposites also nourish each other, water will simultaneously grow. This amounts to a paradox of (much poorer) Zeno-ness: neither destruction nor nourishing will be allowed.

“There is a general opinion that contrary is nutriment to contrary (ἐναντίον τῷ ἐναντίῳ); not of course in every case, but among such contraries as have not merely their birth from each other, but their growth as well; for many things arise from each other, but they are not all quantities; e.g. a healthy from a diseased thing. But not even the things mentioned seem to be food for each other in the same way; *water feeds fire, but fire does not feed water*. It seems, then, that in simple bodies especially the food and the thing fed are contraries. But this presents a difficulty; for some say that like is fed, as also it grows, by like, but others, as we have said, hold the opposite view, that contrary is fed by contrary, on the ground that like is unaffected by like, but that food changes and is digested.” (Aristotle, *De Anima* II.4, 416a 22- 416b, my emphasis)

Aristotle does not seem to argue the proposition on water and fire as if it was something that needed to be established, he merely states it that fire is nourished by water or moisture, and not *vice versa*. Heidel (1911) makes use of the passage by claiming that, as Aristotle above says, there is a contradiction in Greek theories of nutrition: On the one hand, it is said that like nourishes like. On the other hand, it is said that the opposites nourish and give birth to one another. Aristotle solves the problem presented in the above text by claiming that food changes when affected by that which it feeds; so that food is something different than (if not wholly opposed to) humans, but once eaten, the food changes and becomes somehow part of that which is fed: “...for when the food is undigested, contrary feeds on contrary, but when it is digested, like feeds on like” (Aristotle *De Anima* II.4, 416b 6-7)<sup>93</sup>.

Organic beings are being fed by what is like, only the ‘simple bodies’ are being fed by what is opposite, as we see Aristotle claims, the simple bodies here being fire and water. But Aristotle is unmistakeably clear in his claim that water feeds fire, but not *vice versa*. This would leave that the only body that would be nourished by its opposite is fire. And fire being nourished by water is dependent on evaporation: “Fire is fed by water. But it is water in the form of vapour that feeds fire, and in the physiology of nutrition evaporation, under one name or another, played an important role.” (1911:142). In the Greek mindset there was a commonly held principle that *generation* and *nourishment* were effectuated by the same things, that which constituted also nourished. And in fact in the explanation of water nourishing fire, water becomes vapour which ignites and thus adds to the already existent fire. So is this a case of water nourishing fire? In an explanation of material (first) causes, yes. But it is not as an exposition of the substance that was in contact with fire – because that was fire itself. “...we have to do with the phenomenon of evaporation in which water passes, according to the common opinion of the Greeks, into a tenuous form (...) and adding itself *as*

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<sup>93</sup> The commonly held assumption that water was nourishment for all things was justified by the assumption that water was not a ‘pure’ element; it contained every foodstuff for every body or organ that it nourished: “Water, as a nutrient, is a mixture of all the ingredients suitable to the body” (Heidel 1911:142).

*fire to fire*; for in a true sense it is the fire emitted by the sun returning to its own” (Heidel 1911:146, my emphasis).

There is then little or nothing left of the assumption that opposites feeds opposite, according to Heidel. Fire does not feed water, and fire is fed by ignited vapour, itself now in the form of fire; ‘like to like’.

Anaximander need not have been as consistent in his explanations as we would like him to be, and a common cultural idea about water as nourishment for all things, including its opposite forces, could be enough for him to state that there is *some* balance between the opposite elements. After all, he could very well see that the world did exist, and had not become a fiery desert, in spite of there being opposite forces at work in it. I would still hold that if the Greeks had a common idea about water turning into fire, one would not only need to, but also want to, explain how this process could be reversed – especially if this process and its reversion were the fundamental forces at work in one’s theory about nature.

Kahn gives giving plentiful evidence of water as generating and nourishing fire in early Greek thought<sup>94</sup>. He also documents the Greek principle of attraction ‘like to like’, with the corresponding repulsion of opposites, citing plenty evidence.<sup>95</sup> This however is treated as an embellishment of the idea of the opposites’ generation and nourishment of each other, a part of a complex cultural many-faceted picture of the opposites’ interrelations, rather than as a principle which in fact contradicts the principle Kahn’s interpretation of Anaximander’s

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<sup>94</sup> The Hippocratic treatise *The Sacred Disease*, chapter 16: “dull things arise from bright ones, hot things from cold, damp from dry”; Plato in the *Phaedo* (70d-e): “...take all animals and all plants into account, and, in short, for all things which come to be, let us see whether they come to be in this way, that is, from their opposites if they have such (...) Let us examine whether those that have an opposite must necessarily come to be from their opposite and from nowhere else...”; Aristotle *De Generatione et Corruptione* I.3.318a23 “the destruction of one thing is the generation of another”, and *ibid.* II.4.331a7 “Since it has been determined in a former discussion that the coming-to-be of simple bodies is out of one another” (...) “Now it is manifest that all of them [simple bodies] are of such a nature as to change into one another; for coming-to-be is a process into contraries and out of contraries, and all the elements are characterized by contrarieties on to another, because their distinguishing qualities are contrary”.

I take argument with the use of these citations from Aristotle as evidence of Anaximander’s view. The argument that ‘destruction of one thing is generation of another’ is *Aristotle’s own argument* on order to explain how change and coming-to-be in our world is eternal and unceasing. Anaximander’s explanation of the eternal creation and change, as we have already seen, is the Unlimited. As for the second part of the evidence, Aristotle with “a former discussion” refers to *De Caelo* III.6.304b23 and following where he proves that the elements have to be created from the elements, “...there is no body from which the elements could be generated, for that would mean that some other body was prior to the elements”. The reminder of the *Gen. et Corr.* text he presents his own sophisticated theory on ‘the elements’, a theory based on the ancient idea of ‘the opposites’ but involving ontological assumptions unavailable to Anaximander (primary the separation of substance and their attributes).

<sup>95</sup> Empedocles B 62, 6; B 90; B 110, 9; Anaxagoras B 15; Democritus B 164; Plato *Timaeus* 53a.4-6; *De Victu* 6.

fragment relies on. In a later commentary on Anaximander's meteorological theories Kahn writes that the "cosmic forces of cold and heat, dampness and drought, darkness and light (...) are bound not only by opposition, but by bands of mutual dependence: the hot element is nourished by the moist, while the lower ἀήρ must draw its power of action from the evaporative heat of the sun" (Kahn 1994:109). He further supports this by citing *De Victu* 3: "Fire has the power of moving all things all throughout, water of nourishing all things all throughout", a common presupposition of all Greek natural philosophers. This runs parallel to Heidel (1911:142): "First we should remember that fire is the active or motive force in the world, and that moisture is *par excellence* the nutritive element: fire is fed by water".

Other Presocratic philosophers also explained the generation of opposites by their opponents. Simplicius ascribes to Anaximenes the view that everything is a modification of air<sup>96</sup>. Heraclitus spoke of water coming to be from earth and earth as the 'death' of water, Anaxagoras claimed that "in everything there is a portion of everything" and that all changes are just changes in quantity of the different substances in things. Anaxagoras further stated that "from the clouds water is separated off, and from water earth, and from earth stones are condensed by the cold"<sup>97</sup>. Melissus, in a context where he would try and avoid any unpopular view<sup>98</sup>, says that "earth and stones seems to come to be from water"<sup>99</sup>. There is also evidence of a similar view in Plato's *Timaeus* (56 ff), where the four basic 'elements' are composed of two primary kinds of triangles.

All these are evidence of a complex conceptual tradition of basic stuffs and primary elements changing into other primaries, some philosophers naming one primary, others naming some other. For some it was opposites that generated each other, for others there was a single element that created all other elements<sup>100</sup>. Other ancient descriptions of the opposites' collaboration are friendship, love, mixture and harmony<sup>101</sup>.

To these claims of cultural frequency and commonplace presuppositions I can hardly protest. But this still does not address the question that arises, namely: If water is known to sustain everything, even its opposite, fire and heat, how is fire supposed to sustain water? Surely I can

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<sup>96</sup> "Rarefying, it becomes fire, condensing, it becomes wind, then cloud, then condensing further water, then earth, then stones and the rest come from these" (Simplicius, *Physics* 24, 29 = DK13 A5 = KRS 140).

<sup>97</sup> Fragment 16 = KRS 490

<sup>98</sup> See Lloyd (1987:141)

<sup>99</sup> Fragment 8 = KRS 537

<sup>100</sup> Of course, it is not correct to speak of 'elements' as a concept all Presocratic philosophers used or even had referential access to. The term is used to signify simple bodies of primary ontological status that can be, but is not necessarily, an opposite of another primary simple body.

<sup>101</sup> Previously referenced to by the summary in Kahn (1994:132), see above in this essay.

see that if one accepts the paradox of water nourishing fire, one can be asked to be kind enough as to accept one more paradox. But water nourishing fire at least has an explanation that is not contra-intuitive to the ancient Greek mind. That water evaporates into dampness can be tested empirically, while of course damp air becoming fire, or increasing some fire nearby, can not. But there is at least *some* observational-based reasoning involved in this explanation. While damp air being cooled off will ensure the appearance of water, cooling is not fire in another form; there is no analogy between water-vapours and fire-coldness, and fire and flames will not generate water no matter how they are manipulated. In *Physics* II.8, 198b17 Aristotle writes that “...the rising vapour must needs be condensed into water by the cold, and must then descend...”, which shows that he is fully aware of the fact that water vaporizes if heated sufficiently, and is turned back into its liquid form when chilled.

I have still to see any textual evidence for the idea that to Anaximander fire could somehow be assumed to generate water, let alone feed it. And to me that seriously scars the picture of Anaximander believing in a cosmos that was set in motion by the Unlimited and then forever after being self-sufficiently balanced between the opposites and their love-hate relationship.

There is however the great mass of textual evidence to the effect that the opposites are ‘giving nourishment’ (or some other form of collaboration) to each other while simultaneously counteracting one another. Kahn (1994) describes it so: “There is practically no limit to the number of texts which could be cited in illustration of this view of nature as a dynamic interplay between conflicting powers” (1994:133). One way to combine this cultural legacy with the notion of the Unlimited as material principle of all matter is to clearly distinguish between generation and nourishment<sup>102</sup>. Giving nourishment, or collaborating as friends or lovers or notes in a harmonious musical play, is certainly not the same as being each other generating force. Allowing the opposites to nourish each other or otherwise collaborate, do not simultaneously commit us to claim that they create each other.

The reason I am contesting the interpretation of the opposites as opposed each other, and simultaneously nourishing and giving birth to one another, is that it is just that: an interpretation of Anaximander’s intent about the opposites. And one at that which does not explain the role of the opposites to a satisfying degree, or so I believe. It is not contested that

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<sup>102</sup> Of course, the suggestion to sharply divide generation and nourishment is in violation of the principle of nourishment described as ‘like to like’ and the principle elaborated upon it, “a thing is constituted of that by which it is nourished” (Heidel 1911:142). But the above solution I offer to counter the notions of ‘nourishment by opposites’ interpreted as ‘generation by opposites’, thus it is more in support of ‘like to like’ after all.



there in Presocratic thought was an idea of balance between the opposites, sometimes in the sense of opposites nourishing each other, and also an idea of competition between these opposites. What *is* contested is that Anaximander would find this soothing idea of balance to be a satisfactory exposition of the physical causes underlying our universe, when we know that he stated that the opposites are constantly committing injustice and paying recompense towards each other for this injustice, possibly until the earth is irrevocably annihilated and returned to the Unlimited as a result of this struggle.

“It is clear that he observed the change of the four elements into one another, and was unwilling to make anyone of them the underlying stuff but rather chose something else apart from them. He accounts for their generation not by the alteration of the element but by the separation of the opposites by the eternal motion” (Simplicius, *Physics* 1.2.24 17-25 = DK12 A9 = 119 KRS)

Hankinson makes use of this report by Simplicius and argues that “if Simplicius summary is accurate, Anaximander espouses a Principle of Conservation, of the sort which does away with the need for an unlimited mass of background material to replenish the processes of generation. Things change into one another endlessly, but without affecting the Universe’s total mass. An eternal but finite world need never run out of causal steam; the ‘eternal motion’ (...) will see to that (Hankinson 1998:16-17). But Hankinson is not correct in this. For Anaximander does *exactly* claim the existence of a “background material to replenish the processes of generation” in that he says the Unlimited separates out the opposites<sup>103</sup>. Simplicius says explicitly that Anaximander saw how the ‘four elements’,<sup>104</sup> changed into one another and for this reason *exactly* did not make any one of them the material ground for all else, but made the Unlimited the ground for their generation. Hankinson’s argument that Anaximander espouses a Principle of Conservation is then incorrect, rather Anaximander espouses something like a Principle of Infinite Basic Material (an alternative suggestion Hankinson considers, but then rejects).

Lloyd (1970:258) writes that in the late fifth and early fourth centuries the hot and the cold, the dry and the wet, either alone or in conjunction with other opposites, were used in at least two types of physical theories: (i) where they figure as elements themselves i.e. as the primary substances of which other things are composed; and (ii) where they are associated with the

<sup>103</sup> Whether or not there is an “eternal motion” at work in the Unlimited which effectuates the separation out of the opposites has been a debated issue; it is now commonly held that Simplicius is mistaken in ascribing an ‘eternal motion’ and Hippolytus ascribing a ‘swirl’ to Anaximander.

<sup>104</sup> Though this is another mistake by Simplicius, the theory of four elements and their mutual change into one another is a theory developed in full by Aristotle.

elements when these were conceived in the form of other substances<sup>105</sup>. How far back can we trace the use of opposites in cosmological doctrines? With the exception of some fragments of Heraclitus (notably fragment 126) we rely on Aristotle and Theophrastus and sources which were dependent on them. Generally it is stated (1970:260) that when Aristotle or the doxographers have attributed a theory based on contraries (or on the hot and cold in particular) to a Presocratic philosopher, they have reformulated the theory in question<sup>106</sup>. In Pseudo-Plutarch *Stromateis* 2, where the *gonimon* is accredited with the production of ‘the hot’ and ‘the cold’, it seems that the reference to hot and cold is a comment on Anaximander’s theory rather than a verbally correct report. Lloyd argues. Anaximander seems only to have spoken concretely of ‘flame’ and ‘mist’; “what was produced from the Boundless was not ‘the hot’ or ‘the cold’ as such, but rather such substances as (e.g.) flame and mist” (Lloyd 1970:265). “In the earliest physical and cosmological theories which have survived in original fragment (those of Xenophanes, Heraclitus, and Parmenides) the primary elements of which other things are composed are such substances as water and earth, fire, light, and night, and not the hot, the cold, the dry, and the wet themselves” (*ibid.*).

However, there is no reason to doubt that that an important feature of Anaximander’s theory was that the relationship between the substances in question was conceived as some sort of *opposition*. As often elsewhere, Lloyd uses the extant fragment to support this contention. Though that in the reports of Aristotle and Simplicius Anaximander’s ideas have been reformulated, “the extent of that reformulation might not have been very great”, he holds (1970: 268). Whatever the substances were that separated out from the Unlimited, the notion of some opposition between them certainly seems to have been part of Anaximander’s theory. The evidence suggests that these substances were fire and mist, rather than the hot and the cold.

Hölscher (1970:292-293) categorically states that “The opposite qualities, Hot and Cold, cannot be Anaximander’s as such”. His only explicit support for this claim is a reference to Reinhardt’s *Parmenides*<sup>107</sup>, but he also implies that the use of a *quality* to

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<sup>105</sup> In addition there are innumerable pathological theories in the Hippocratic Corpus in which diseases are attributed either to these opposites directly, or to their effect on other substances or part of the body. Hot and cold, dry and wet seem to have been used in pathological theories as early as Alcmaeon. (Lloyd 1987: 258-259)

<sup>106</sup> For instance Hippolytus *Refutation* 1.7.3 = DK13 A7, speaking of Anaximenes’ cosmology: after having described the changes which air undergoes, becoming fire, wind, clouds, water, earth and stones, Hippolytus concludes “Hence the chief factors in generation are opposites, hot and cold.” The interpretation that the substances that separate off from the Unlimited were the hot and the cold, the dry and the wet themselves, rest on the testimony of Simplicius. But Simplicius is, in the relevant texts, “more concerned with describing Aristotle’s text than to describe Anaximander’s doctrine in detail” (Lloyd 1970:263, quoting Kahn 1994:40).

<sup>107</sup> Reinhardt, Karl, 1959. *Parmenides und die Geschichte der griechischen Philosophie*, Frankfurt am Maine, pp. 21 and 24.

describe these opposites witnesses that the description can not be one of Anaximander's. It is a different matter with the Unlimited, though, because the name indicates not a quality but an appearance ("like Fire"<sup>108</sup>). In this I must agree, the lack of separation between substance and the attributes attributed to substances would make the archaic Greek to describe some hot substance not by its attribute alone, but by naming the object invariably exhibiting that attribute. For surely it cannot be the other way around; describing an object known to be warm is done by naming it 'the warm',<sup>109</sup>.

### 3.3.5 Final arguments concerning multiple worlds

Let us then draw some tentative conclusion to this debate. What we want to know is whether or not Anaximander argued the existence of multiple successive worlds.

Though confinement of space prohibits further inquiry into this, as has been stated, Simplicius reports that Anaximander argued multiple worlds (*kosmoi*) within multiple heavens (*ouranoi*). Though multiple arguments have been made in order to interpret these lines differently, there is yet no consent as to what else these refer to, if not than to multiple worlds. Then, by rules of explanatory economics, we should rather see for what reasons Anaximander could have argued multiple worlds.

There are further the reports that Anaximander claimed that the world is drying out:

"Some of the natural philosophers say that the sea is a remnant of the first moisture. For the region about the earth was moist, but then part of the moisture was evaporated by the sun, and winds arose from it... (...) But the part of the moisture which was left behind in the hollow regions of the earth is the sea. Therefore it is continually diminished and dried up by the sun, and will someday finally be dry. Anaximander and Diogenes were of this opinion, as Theophrastus reports." (Alexander, *Meteor.* 67, 3 = *Physical Opinions* fragment 23)

"For first of all the whole area round the earth is moist, but being dried by the sun the part that is exhaled makes winds and turnings of the sun and moon, they say while that which is left is sea; therefore they think that the sea is actually becoming less through being dried up, and that some time it will end up by all being dry [Alexander in *Meteor.* 67, 3] of this opinion, as Theophrastus relates, were Anaximander and Diogenes." (Aristotle, *Meteor.* II.1, 353b6 = KRS 132 = DK12 A27)

These texts, which also Finkelberg (1994:503) finds convincing, indicates that the world was not viewed as eternal, but as perishable and, in fact, perishing. The great fire that dried out the

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<sup>108</sup> Hölscher (1970:293 n 30)

<sup>109</sup> This is obviously so because several objects or things can be warm, though only that particular object (e.g. Fire) can be that particular object (understood as type-object and not token-object; i.e. there can be (and are) several fires in the world).

moist earth at the beginning of the world will evidently continue this drying out, and not be ‘kept in check’ by the water.

There are multiple fragments on Anaximander maintaining that the Unlimited is eternal and indestructible. Indeed the only other sentences in the doxography counted by Diels-Kranz as genuine Anaximandrian fragments, besides the extant fragment of Simplicius’, are “this [some certain unlimited nature] is eternal and ageless”, τούτην αἰδίων εἶναι καὶ ἀγήρω, (Hippolytus DK12 B2, from A11) and “[the Unlimited] is immortal (...) and indestructible”, ἀθάνατον... καὶ ἀνώλεθον, (Aristotle DK12 B3, from A15). What do we make of this? We have already seen the explanation of Unlimited and its abilities and attributes. It is necessary for the Unlimited to be eternal because, as we have seen, it needs to itself be uncaused and to not stop its causation in the world, or of the worlds. But why accentuate the *indestructibility* of the Unlimited? It seems a redundant property to possess for one who already possesses immortality.

But it is not redundant. It is important because, as we have seen from the extant fragment; by being a primary body (an opposite), or, I hereby suggest, in some manner being *reducible to one* as such, one can be destroyed: for then there must be opposing powers that will, sooner or later, vanquish you. This is the lesson of the extant fragment (at least a part of the lesson). Thus Aristotle witnesses to how Anaximander explains destruction; by the struggle of the opposites, and only by being indeterminate is one ensured eternal life and to avoid destruction. If being neither made from the opposites, or being reducible to the opposites, or participating in the opposites in any way (as we could imagine Plato phrasing this relationship) is the only way to avoid there being some opposed power that will bring forth your destruction, then the earth, too, must sooner or later be destroyed. Only that which came before the opposites and is too undifferentiated to in any way causally reduce to the opposites, will avoid destruction. This because destruction in fact is nothing but the primary and essentially opposed forces somehow “contained” within an object being encroached upon by their opposed powers, a process which metaphorically is called ‘injustice’. There will be ‘paying of justice’ to this ‘injustice’, sooner or later, because destruction and coming-to-be is a part of the natural order of things.

This is why I in the end hold that Anaximander claimed multiple worlds; because the world is not undifferentiated – in fact we have seen that Anaximander maintains that the world was created from ‘fire’ and ‘mist’, or ‘hot’ and ‘cold’, and that coming-to-be and destruction in the world happens because the Unlimited separate out the opposites – it must be

destroyed. The man of balance that Anaximander was, never establishing a power without some opposing power in order to maintain cosmological equilibrium; to him the birth, existence, and destruction of the earth would not be a singular cosmological happening. It would be a part of a greater cycle of destruction and coming-to-be.

Given that Theophrastus reported correctly<sup>110</sup>, we can hold that Anaximander claimed the following: (i) the Unlimited, which is divine and eternal, gives life to the world, which is not eternal<sup>111</sup>, (ii) the substance that creates is the substance that what is created returns into, (iii) the world is generated from the opposites cold-wet and warm-dry<sup>112</sup>, (iv) as a result of this, our world is drying up, and has been since its beginning, (v) there is a balance in nature, a way of things which makes it so that no force or power or quality will be stronger than its opposite – over time. All this suggests that the Unlimited creates worlds that are in constant pull between opposites, that eventually one of these opposites will defeat its opponent and so destroy the world, and that the Unlimited will create another world. It possibly follows from this that the next world will succumb to the opposite forces than the last one; since our world is drying up, the next world will drown. But it might also mean, as Vlastos (1947) suggests, that once the world is absorbed back into the Unlimited, the opposites pay their final debt to each other. The next world, then, starts from neutrality, as it would in a balanced universe.

### 3.4 On justice

The fact that Anaximander frequently is attributed a theory on ‘cosmic justice’, seemingly the guiding principle of all cosmic enterprise, makes it pertinent to investigate this notion of justice. Justice in Anaximander, it seems to me, is not expressed as a universal principle like that of Heraclitus<sup>113</sup>, rather, as an internal correcting mechanism of the opposites or the

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<sup>110</sup> And here I agree with Finkelberg (1994:496); we should not prefer interpretations that relies on Theophrastus’ text to prove that Theophrastus was wrong. Also, that there is a possibility of Theophrastus making a mistake in his interpretation of Anaximander, does not warrant the assumption that he did make mistakes. This must be proven before we present as more accurate interpretations that compete with those of Theophrastus’.

<sup>111</sup> Finkelberg (1994:498).

<sup>112</sup> Or some substance to which we can ascribe the attributes ‘hot-dry’ and ‘cold-wet’ e.g. ‘fire’ and ‘mist’.

<sup>113</sup> Heraclitus had a concept of δίκη which treated ‘punishment for the violation of law’ as a cosmic and universal force, a force which controlled the path of the sun and embodied the principle of conflicting forces. Δίκη for Heraclitus stands “as an embodiment of his view of the unified opposition of all things, a concept which was perhaps suggested by Anaximander” (Gagarin 1974:195); it was a universal cosmic force of balance and order.

existing things, based upon the opposites. In the following I give will present the reasons for this opinion.

In the extant fragment the terms ‘justice’ (δίκη), ‘injustice’ (ἀδικία), and ‘settlement’ (τάξις) occurs, in what is frequently recognized as legalistic metaphors for cosmic principles<sup>114</sup>. Although there is some disagreement as to what the subjects to this justice are<sup>115</sup>, there is nonetheless agreement that this principle applies to things in the world. Most interpretations, with some notable exceptions as e.g. Vlastos (1947), hold that the settlement for injustice happens between the ‘litigants’ themselves and does not try to establish some elaborated sense of ‘cosmic justice’.

Kahn (1994) agrees to this opinion and defines injustice in the extant fragment thus: “The archaic view of ἀδικία is just this, that one who is guilty will always pay the penalty (...) The victory of one element over another is ἀδικία because the weaker party suffers, and because of the disastrous consequences which must ensue for the offender” (1994:183). He argues that the description of one element’s dominion over another as unjust does not have to imply belief in any state of harmony outside of the mundane state of things. It is simply a description of that singular relationship between the elements in question. Contrary to this, Vlastos (1947) argues that balance and harmony is what is referred to by ‘justice’ and so ἀδικία is the breaching of that state of harmony.

Gagarin (1974) argues that δίκη in the archaic period (the seventh, sixth and fifth century BC) had its primary application in the area of law and lawful behaviour, defined as *property law and economic behaviour* (1974:196)<sup>116</sup>. Δίκη had in the archaic period still not become a moral value; it was to remain a strict legal term until the sophists, followed by Plato and Aristotle, developed it into an adjective applied to general behaviour, when asking how citizens could become δίκαιος. In the archaic period, then, the term δίκη was not applied to general behaviour. The phrase ἀδικία in Anaximander Gagarin holds means ‘injury’, either by (economic) improper or unlawful behaviour. The phrase δίκη, he says, was used by Anaximander in the sense of ‘settlement, penalty’. As to whether Anaximander thought of δίκη as anything more than settlement or penalty, in particular whether he considered δίκη to be a universal cosmic force, we do not know, Gagarin writes (1974:195). The mundane,

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<sup>114</sup> c.f. e.g. Hankinson: “In describing the passage as poetic in language, Theophrastus (whom Simplicius follows here) presumably took it metaphorically: the Universe does not really follow the dictates of some quasi-divine justice.” (1998:17)

<sup>115</sup> e.g. multiple worlds; (all) existing things; the elements; the opposites.

<sup>116</sup> This emphasis on economics and property is the same one that attached to the word and its related δίκη-words in Homer and Hesiod in the eighth century.

economic and proprietary meaning of the word indicates some simple quantitative exchange and not a more elaborate sense of transgression towards cosmic principles.

Let us look at Vlastos' (1947) contrary interpretation. He writes: "To respect the nature of anyone or anything is to be 'just' to them. To impair or destroy that nature is 'violence' or 'injustice' (...) Cosmic justice is a conception of nature at large as a harmonious association, whose members observe, or are compelled to observe, the law of the measure." (Vlastos 1947:56) He argues that it is not towards the Unlimited that 'injustice' is being done, but rather towards the opposites, from their opposites. It is only when the world is destroyed and the opposites are returned to the Unlimited that cosmic justice is achieved.

KRS does not agree and rhetorically ask (KRS 2004:119 n 1): If the world is constituted by a balance between opposites, then why would the world ever return to the Unlimited? In other words, why would a perfectly balanced world be destroyed? It may appear that Anaximander emphasizes *injustice*, ἀδικίας, between the opposites that constitute the world; thus the opposites are wronged by each other and so seek compensation, but in doing so, they take more than their rightful share and commits injustice, inviting the other opposite to do the same again. This is a system of balance, but of *imperfect* balance. Thus the world *is* maintained in a balanced system but still will exist for a limited amount of time only. Its destruction is encoded in its construction, just like in any other living being. Though this seems like an inviting interpretation, Vlastos argues that that state of cosmic justice is also realized in the developed world; the Unlimited surrounding the world such as no other opposites may enter and disrupt the balance. And so he cannot explain why the world, perfectly balanced that it is, would ever return to the Unlimited.

### 3.5 Causation in *On Nature*

#### 3.5.1 The Principle of Sufficient Reason

As previously discussed<sup>117</sup>, Anaximander argued that the earth's stability was to be explained not by any one material supporting factor, but rather the absence of a reason to move. This explanation is usually analyzed as utilizing the same reasoning that much later would be explicated in one of Leibniz' two "great principles", *The Principle of Sufficient Reason*<sup>118</sup>.

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<sup>117</sup> See 3.2.3 *Position and shape of the earth* in this essay.

<sup>118</sup> "the Principle of Sufficient Reason, in virtue of which we believe that no fact can be real or existent, and no statement true, unless it has a sufficient reason why it should be thus and not otherwise" (Leibniz, *Monadology*, §32). This means that nothing can be so without a reason why it is so; that nothing occurs by blind chance.

Barnes (1979:23-28) formalizes Anaximander's use of this principle in explaining the earth's rest thus:

A straight line drawn from the centre of the earth to the border of the finite cosmos is a *cosmic spoke*. A spoke  $s_1$  is similar to a spoke  $s_2$  if every point,  $p_1$ ,  $n$  units from the earth along  $s_1$  is qualitatively indistinguishable from the corresponding point  $p_2$ ,  $n$  units from the earth along  $s_2$ . While Hippolytus' text suggest that all cosmic spokes are similar, Aristotle's text suggests only that spoke directly opposed ('opposed' in this context means that two spokes form an angle  $180^\circ$  in all planes at the centre of the earth) to each other must be similar. Anaximander does not need any premise which includes more than

(1) For any cosmic spoke  $s_i$ , there is a distinct spoke  $s_j$  such that  $s_j$  is similar to  $s_i$ .

Now the claim of Anaximander is that the earth does not move either along spoke  $s_j$  nor along spoke  $s_i$ , because it has no more reason to go in one direction than the other. But if we now suppose that the earth is moving, Barnes suggests, e.g. along spoke  $s_1$ , then

(2) The earth is moving along spoke  $s_1$

The motion described in (2) must then for Anaximander have a reason and thus be subject for explanation. Anaximander is then implicitly relying on some such principle as

(3) If  $a$  is  $F$ , then for some  $\phi$ ,  $a$  is  $F$  because  $a$  is  $\phi$

From (2) and (3) Anaximander may validly infer

(4) For some  $\phi$ , the earth moves along  $s_1$  because  $s_1$  is  $\phi$

If the explanatory feature of  $s_1$  is  $G$ , then we would have

(5) The earth moves along  $s_1$  because  $s_1$  is  $G$ ,

And then

(6)  $s_1$  is  $G$

Then, by (1) and (6)

(7) Some  $s_j$  distinct from  $s_1$  is  $G$

Suppose, then

(8)  $s_2$  is  $G$

At this point, Barnes (1979:25) writes, Anaximander needs another principle, namely that explanations are 'universalizable'. A fitting formula here would then be

(9) If  $a$  is  $F$  because  $a$  is  $G$ , then if anything is  $G$  it is  $F$

Between them, (3) and (9) amount to something like the Principle of Sufficient Reason: (3) asserts that happenings need some explanation, (9) indicates how that explanation must be a sufficient condition for what it explains. From (5) and (8) and (9) follows

(10) The earth is moving along  $s_2$



Since nothing can move in two directions at once, (2) and (10) are incompatible. Therefore (2) is false and the earth must stay where it is.

This argument reveals an awareness of certain central features of our notion of explanation, Barnes (*ibid.*) writes. Of course, the argument is not sound; premise (1) is based on Anaximander's astronomy of 'similarity' and is easily falsified. Philosophically, though, the Principle of Sufficient Reason can be attacked both by questioning premise (3) and premise (9). Premise (9) can be countered by claiming that certain features should simply have an effect on some occasions and not on others. Premise (3) can be countered by chance effects. Another objection is employed by Aristotle in *De caelo* 295b30-33. He creates an analogy to the Principle by saying that if a hair is pulled on in both ends, when each pull is of exactly the same strength, according to the Principle the hair will not break no matter how hard the pull is. A similar objection to this Principle is what is the paradox known as 'Buridans ass', recreating the picture with an ass and two identical portions of hay. Subsequently the ass would starve to death for its inability to choose between the portions. It should prove the Principle wrong, then, that a real ass would not starve to death in a similar situation. The animal would simply choose one of the portions, either for no explainable reason, which would make (3) false, or the choice is explained by the chosen portion having a feature that the other portion also has, thus making (9) false.

Barnes concludes that objections to (3) and (9) are not conclusive against Anaximander, "for these are presuppositions of any scientific astronomy; if (3) or (9) collapse then the goal of astronomy itself is unattainable, and we cannot find universal laws explanatory of the celestial phenomena" (1979:26). Even though we cannot *a priori* prove (3) or (9), we should not abandon them, Barnes says, because to abandon them is to abandon the ideals of science.

It seems, then, as if Anaximander through implications invented the generalization of sufficient cause. But is this ingenious type of reasoning really Anaximander's? It is Aristotle that presents this claim and the reasoning behind it. That context, then, might suggest that the reasoning is Aristotle's own. However, Aristotle, as we have seen above (*De caelo* II.13, 295b30-33), argues against Anaximander and the use of this principle as such; earth must be where it is because that is earth's 'natural place', Aristotle says. This at least indicates that the reasoning is indeed Anaximander's own.

There is one more invaluable piece of information from Aristotle in this context; right before he presents his objection, he says:

“There are some who name it ‘indifference’ as the cause of its [the earth] remaining at rest, e.g. among the early philosophers Anaximander. These urge that *that which is situated at the centre* and is equably related to the extremes has no impulse to move in one direction (...) This argument is ingenious, but not true: for according to it, whatever is placed at the centre must remain there, even fire; *the property is not particular to earth.*” (Aristotle *De caelo* II.13, 295b10-20, my emphasis)

What Aristotle here asserts is that according to Anaximander anything situated at the centre of the extremes will not move, and adds even that this property is not one particular to earth.

This must be viewed as a clear indication of generality of explanation, and, hence, the *generality of sufficient cause*.

Hankinson (1998:15) reminds us that Anaximander presumably did not formulate the Principle of Sufficient Reason with any such generality that Leibniz did. However the use of something very closely resembling the Principle means that there is *a reason or cause for everything that occurs* and that these reasons must in principle be explicable. Further, Hankinson claims, Anaximander’s disqualification of the problem with the earth’s stability means that explanations must be *general*. Furthermore, explanations should at least aspire to completeness, if there is a genuine class of things of a certain type, then their individual type-ness must be susceptible of a unified explanation (*ibid.*). Thus explanations would be, ideally, both necessary and sufficient for what they explain. Thus it promises a fully intelligible world. Hankinson writes (*ibid.*): “But ultimately its truth must be an empirical matter: there is nothing logically impossible about causal indeterminacy, and in an indeterministic world the Principle of Sufficient Reason fails to hold, at least in full generality. But even so, to the extent to which they are explicable, the workings of the universe must conform to the Principle of Sufficient Reason”.

From this I hold that Anaximander indeed postulated that in the deterministic mechanistic world of strict physical causes, *causation is universal*.

### **3.5.2 The Unlimited and generation of the opposites**

I now return to the generation of the opposites, as the mechanisms and laws by which they are generated and they generate would be highly interesting for our current project. Please note that while I earlier have raised objections towards the reliance on the opposites and their internal balance for Anaximander’s theories to be viewed as explanations of (more or less) coherence, I do not by this exclude from Anaximander the notion of something in nature that may be labelled ‘opposites’. By an ‘opposite’ in this context I mean ‘something that

contravenes the specific and essential powers that an object, substance, or property possesses'. In fact I am positively claiming that Anaximander did argue such powers in nature, but I also maintain that he believed "existing things" to rely on these opposites in some way, and that he did not argue for an independent existence of 'the hot' and 'the cold'. His apparatus of concepts and notions had not evolved into that stage where one separates properties from substances into abstract concepts.

Let us then look at the doxographical evidence for generation of the opposites:

"But the others say that the opposites are separated out from the One, being present in it, as Anaximander says and all who say there are one and many, like Empedocles and Anaxagoras; for these, too, separate out the rest from the mixture". (Aristotle, *Physics* I.4, 187a20 = KRS 118)

"It is clear that he [Anaximander], seeing the changing of the four elements into each other, thought it right to make none of these the substratum, but something else beside these; and he produces coming-to-be not through the alteration of the element, but by the separation off of the opposites through the eternal motion". (Simplicius, *Physics*, 24, 21 = KRS 119)

"He says that that which is productive from the eternal of hot and cold was separated off at the coming-to-be of this world, and that a kind of sphere of flame from this was formed around the air surrounding the earth, like bark around a tree. When this was broken off and shut off in certain circles, the sun and the moon and the stars were formed". (Pseudo-Plutarch, *Stromateis* 2 = KRS 121)

If Anaximander indeed specified how the opposites are generated, that information is lost to us. If the interpretations claiming that Anaximander argued some 'eternal motion' for the creation of opposites (or multiple worlds) are correct, how, exactly does the Unlimited through the 'eternal motion' create them? It seems the eternal motion contributes to the entire theory of the Unlimited as creator greater explanatory strength, in so far as it suggests some *change*, or some *powers (kinesis)* that could be natural to pursue in connection with creation. It has, however, been shown in this essay that the idea of causes having some *kinesis* or being somehow empowered with creative efficiency is a 'modern' concept of causes, one influenced by the Stoics' notion of cause. There is then simply not fitting to attribute to Anaximander any generative power or constant changing life-force as a cause.

Nevertheless, the questions concerning analysis of causation *as such* have to do with whether the generation of the opposites happens with some sort of necessity or not. Does the Unlimited *have* to generate opposites? Under what conditions will this generation occur? Given that the Unlimited is deathless and ageless<sup>119</sup>, in modern terms 'eternal', necessitation

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<sup>119</sup> cf. DK12 B2; B3 in the context of DK12 A11; A15

in that generation could mean that opposites are generated ceaselessly, and, therefore, if the opposites create worlds, new worlds ceaselessly would be created.

I would find this a very strong argument in favour of Anaximander postulating multiple, successive worlds. But does Anaximander postulate necessity in generation of opposites? Or is this generation of the opposites from the Unlimited an isolated incident, something that occurred once in the history of the Unlimited? I do not find the latter idea very appealing, given how Anaximander describes the Unlimited according to the doxographical sources. It appears to me described as an eternal entity, which produces the opposites cyclically and predictably, mirroring the reproduction cycles in biological entities. Should the generation of the opposites be an isolated incident, we surely could expect Anaximander to explain why this freak incident occurred. For if there is no further explanation as to why the Unlimited generated opposites at one point in time, it could do so again, an unlimited number of times, just as well as it would never do so again. This explanation of the present, actual world would therefore be a failed explanation, for it fails to explain the existence of this world. It is a regressive move that merely pushes the explanatory gap one step further down our inference. The world is explained by the opposites, but these again are not explained, merely *described* by reference to some unspecified creation by the Unlimited.

It might well be that we should not expect some coherent notion of causation in Anaximander, but we could expect some coherent (notion of) explanation from him, or so I think. I think it is clear that Anaximander did assume that all things had causes, and if they did not there required some special explanation for that unique being (e.g. the Unlimited being uncaused).

According to Hankinson (1998), it is not necessary for Anaximander to explain the opposites: “Anaximander does not tell us how the great cosmic cycle is powered (beyond adverting to the ‘eternal motion’). But this is not necessarily an explanatory deficiency: admitting that some things are beyond explanation may rather be straightforward realism” (1998:17). The reasoning has to stop somewhere, the argument goes, or else one finds oneself in explanatory eternal regress. Consequently Anaximander applies explanatory foundationalism or realism, as Hankinson would have it. Now, if he by this indicates that what causes the Unlimited to generate cyclically is and must remain unexplained, I halfway agree, there are special rules and circumstances for the Unlimited, explained by the Unlimited’s special status. If he by this indicates that the opposites need no explanation, then I think him mistaken; I maintain that Anaximander argues all physical objects to have causes.

### 3.5.3 A theory on ‘separating out’ and ‘separating off’

I have previously claimed that Anaximander held that the world comes from the Unlimited, in a process resembling or describable as biological reproduction<sup>120</sup>, further that the image of opposites in perfect balance maintaining the world can not be a correct one; rather the opposites (or, possibly, all the content of the world, including the opposites) comes from the Unlimited and into the world, are then followed by a period of injustices between the opposites, which ends in, well, the end of the world. When the time is right (i.e. ‘according to the assessment of Time’) the Unlimited will create another world, and so forth.

My interpretation of the relationship of the Unlimited to the present world (independent of whether this is the only world or not) depends on there being two separate *modi operandi* of the Unlimited: (1) creation of that which is productive of the hot and the cold, the γόνιμον, that further creates the world; and (2) generation of things in the world, including opposites, that will ensure the sustained (though not eternal) existence of and continued change in the world.

The task of (1) is seen in Pseudo-Plutarch *Stomateis* 2 = KRS 121 where it is reported that “...that which is productive of the hot and cold was separated off (ἀποκριθῆναι) from the eternal at the coming-to-be of this world”<sup>121</sup>; the arguments for action (2) is seen in Aristotle *Physics* III.4, 203b15 = KRS 106: “Belief in infinity would result (...) because only so would generation and destruction not fail, if there were an infinite source from which that which is coming-to-be is derived”. Admittedly this is a naïve view, that leaves open great explanatory gaps in reference to how exactly this unlimited supply of material is going to provide the world with a steady supply of matter, but that does not mean that Anaximander would not hold such a belief, or that it is a failed explanation. Aristotle later argues *against* the necessity of an infinite source (*Physics* III.8, 208a5 ff), but in doing so he presents *his own* critique of his predecessors, and the situation is resolved by Aristotle’s own solution that “it is possible for the destruction of one thing to be the generation of the other” (*Physics* III.8, 208a8 = KRS107). In KRS’ view this is in fact exactly what Anaximander meant; “that there is no wastage: opposed substances make retribution to each other for their encroachments. Provided the balance is maintained, all change in the developed world takes place between the same original quantity of separate, opposed substances.” (KRS 2004:114-115).

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<sup>120</sup> Whether this resemblance is metaphorically intended or not, is difficult to tell. Anaximander might very well have conceived of all generation of life as actually resembling that of biological entities, but he might also well have intended nothing but a recognizable allegory in order to further the explanatory strength of his cosmogony.

<sup>121</sup> Originally formulated “...that which is productive from the eternal of hot and cold was separated off at the coming-to-be of this world”

When KRS thus interpret Aristotle's critique of Anaximander they firstly assume there to be something inconsistent or non-combinable between the statements of KRS 105<sup>122</sup> and KRS 106<sup>123</sup>, which I believe there is not; the fragments simply state different reasons for the existence of the Unlimited. To understand that the infinity of one primary element would ensure the suppression of all opposed elements is perfectly compatible with the idea of the infinity of the primary element in order to provide the world with an eternal supply of matter, in fact, they seem to together to form an argument concerning the nature of the Unlimited: that which is the ἀρχή has to be unlimited spatially and temporally, and that means that it cannot be identified with any of the primary elements. Dancy (1989) provides excellent argumentation for the claim that Anaximander had more than one reason for stating the existence of the Unlimited, and that its many attributes (infinity in time, infinity in space, undifferentiated internally) were attributed to it as deductions in an argument and not simply as what naturally followed from naming the originating element 'τό ἄρριπον'. Secondly, KRS take Aristotle's objection against Anaximander's reasoning to be in reality exactly that which Anaximander argued (KRS *ibid.*), thus claiming Aristotle had mistaken the answer that Anaximander gave for its exact opposite. Aristotle's own solution is thus made into Anaximander's solution by KRS, and Anaximander's solution (if we grant that Aristotle reported accurately on Anaximander in this case) is turned into some wholly unfounded statement about Anaximander. Yet KRS informs that both Aëtius (*Placita* 1.3.3 = DK12 A4) and Simplicius (*de Caelo* 615.15 = DK A17) repeat this allegedly unfounded reason for stating the undifferentiated nature of the Unlimited, namely that the coming-to-be in the world needs an unlimited supply of matter. Clearly, then, this was at the least one of the reasons named by Theophrastus as Anaximander's ground for statements about the nature of the Unlimited.

There is further the sustained puzzlement of how the opposites are generated from the Unlimited. This question is in itself interesting, as a specification of Anaximander's cosmogony, and extra so for this here essay, as I am trying to map out how the instantiations of causal relations in Anaximander's view. But for the question at hand, whether or not the

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<sup>122</sup> "For there are some people who make what is beside the elements the infinite, and not air or water, so that the rest be not destroyed by their infinite substance; for the elements are opposed to each other (...) and if one of those were infinite the rest would already have been destroyed. But, as it is, they say that the infinite is different from these, and that they come into being from it." (Aristotle, *Physics* III.5, 204b22 = KRS 105).

<sup>123</sup> "Belief in infinity would result (...) because only so would generation and destruction not fail, if there were an infinite source from which that which is coming-to-be is derived." (Aristotle, *Physics* III.4, 203b15 = KRS 106)

Unlimited has two main *modi operandi*, it has provided further possibility of investigation to which I would suggest an answer.

Some of the doxographers have stated that in Anaximander the opposites were ‘separated out’, ἐκκρίνεσθαι, from the Unlimited, while others have stated that the opposites were ‘separated off’, ἀποκριθῆναι, and this semantic difference has generated different interpretations on the nature of the Unlimited. For if the opposites are ‘separated out’ directly from the Unlimited the Unlimited must contain the opposites in their opposed forms and thus be a *mixture of opposites*, or *heterogeneous*. One would assume that the other part of the dichotomy equates that the Unlimited is *homogeneous*. But if the opposites are ‘separated off’ from the Unlimited that means, or so I believe, that any part of the Unlimited could be isolated and parted from the ‘main mass’ (if we allow this type of language about something eternal in size and internally undifferentiated) and the result, that which is ‘separated off’, would be all of the opposites, or at least the main two opposites, the hot and the cold. In that case, how could the Unlimited be homogeneous? If the Unlimited is at every point a perfect fusion of ‘the hot’ and ‘the cold’ so that no matter what part one isolated off one would be guaranteed the same content in that part, then and only then is the Unlimited homogeneous. Hence homogeneous means fusion of indistinguishables.

KRS (2004:130) argues that “if the opposites arose directly from the Indefinite by being separated off, as Simplicius states in *Physics* 24, 21 then the Indefinite was being unconsciously treated as unhomogeneous; for separation off cannot simply imply the isolation of one part of the Indefinite, that part which becomes the world; it implies this *and* some change in the isolated part”. This change, KRS suggests, may be not the appearance of opposites, but the appearance of that which is productive of the opposites, which would imply that the Unlimited contained embryos or sperms. According to KRS this must mean that the Unlimited is heterogeneous, but I fail to see why this must be so. For why is it impossible that the Unlimited is homogeneous *and* that some part of it is capable of change once separated off from the main mass? Why should change in the separated part at all indicate heterogeneousness? The change could simply be the indistinguishables changing into distinguishables. Another more important objectionable point in the argument of KRS is that they equate ‘the opposites’ with ‘the world’. Surely there are great explanatory difficulties with the Unlimited directly separating off the world. But that is not what Simplicius in the referred text says; he says that “he [Anaximander] produces coming-to-be not through the alteration of the element, but by the *separation off of the opposites...*” (Simplicius *Physics* 24, 12 = KRS 119, my emphasis).

My main point in this chapter is nevertheless this: I suggest (and I suspect my reader already have seen where I am going with this) that the two different terms for the generation of the opposites and the two mechanisms or types of labour that the Unlimited performs, what I have called the *modi operandi* of the Unlimited, fit neatly (more or less) together. I suggest that the Unlimited separates off, ἀπόκρισις, “that which is capable of generating the hot and the cold at the creation of this here world”; and that it later, after the world has come into existence, separates out, ἐκκρίνουσι, the things in the world, including the opposites, that generates and powers the change and destruction and coming-to-be in the world. The latter suggests that the Unlimited is a mixture or fusion of the opposites or the potentialities of the opposites, and of these potentialities there is not much to be said, or can be said, for they are without attributes, they are too ontologically primal for description. This fits well with the description of the Unlimited as ‘undifferentiated’. When the potentialities of the opposites are separated out they truly become opposites, with opposite powers capable of committing ‘injustice’ and ‘justice’ towards each other<sup>124</sup>.

Why, then, does not the Unlimited generate both the hot and the cold at the generation of the world *and* the opposites that fuel change in the world, by the same principle? Why must the one be ‘separated off’ and the other ‘separated from’? If we follow previous reasoning presented in this essay it is not a given that it is ‘opposites’ that are generated by the Unlimited, rather there are ‘things in the world’<sup>125</sup>, including those that embody powers of opposition, that are generated into the world in order to sustain it. These, then, will be different from the opposites that created (or creates) the world (or worlds). If Anaximander did not, as is often suggested, abstract out the opposing forces instantiated in the forces of nature into ‘the hot’ and ‘the cold’ but rather made reference to ‘mist’ and ‘fire’ (ref), that would mean he in description and thought did not abandon the concrete manifestations of natural phenomena and powers for the sake of abstracted general principles. When describing the creation of the world he conjured up great rings of mist and fire, and those primeval rings of mist and fire that ultimately created both the world and the heavenly bodies has no place within the developed world. Hence there must be *some* difference in these two modes of generation by the Unlimited.

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<sup>124</sup> See Vlastos (1947 part V, B) for details of this change in the opposites’ ontological status and how it affects ‘justice’ and ‘injustice’.

<sup>125</sup> “And the source of coming-to-be for *existing things* is that into which destruction, too, happens...” (Simplicius *Physics* 24, 13 = DK12 A9 = KRS 101A, my emphasis). The opposites are nowhere mentioned in the extant fragment, and that the fragment indicates that the world consists of opposites (as claimed in KRS 2004:130) is entirely subject to the eye of the beholder.



Why, then, is that which is productive, the γόνιμον, ‘separated off’, ἀποκριθῆναι, and the things in the world including opposites ‘separated out’, ἐκκρίνεσθαι? If the Unlimited is to create fully developed worlds, or heavens, or even seeds that ultimately will grow into worlds, it has to do so by ‘separation off’ and not ‘separation out’, because the Unlimited can not consist of or contain undifferentiated worlds or heavens or seeds even (for what would they be like, or how should they be possible; what is an undifferentiated world?) but it *can* contain undifferentiated opposites. It is because the opposites (whether or not Anaximander used this category as an abstraction of physical phenomena into their bare principles) are fundamental, primal bodies, and that substance and qualities are both considered matter of some sort, that ‘the opposites’ can be mixed into something that is too primal and too intermediate<sup>126</sup> to be differentiated in a mixture, that the mixture can be homogeneous and yet contain opposites<sup>127</sup>. Theophrastus interprets Anaximander as claiming the Unlimited both as a mixture and a single body<sup>128</sup>, which combines neatly with the above. The developed worlds on the other hand are not primal bodies, and would not be subject to unrecognizable enmeshment into each other, and could therefore not be separated directly ‘out’, there has to be some intermediate state of development – and that is the seed<sup>129</sup>, which is ‘separated off’.

If we follow KRS’ claim that ‘separation off’ implies separation *and* a change in what is separated (notwithstanding KRS’ claim about the nature of the Unlimited), the change they speak of, then, would be the change of the *gonimon* into fire and mist (or ‘hot’ and ‘cold’).

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<sup>126</sup> And here I would like to make the suggestion that Aristotle’s interpretation of the *apeiron* as ‘an intermediate substance’ (in *Physics* III.4, 203a16; *Physics* I.4, 187a12; *de Gen. et Corr.* II.5, 332a19) has at least some of its roots; see KRS (2004:109-113) for an attack of the idea that Anaximander called the Unlimited ‘intermediate’.

<sup>127</sup> cf. Guthrie (1977:86-87)

<sup>128</sup> According to McDiarmid (1970:198) he does this by claiming that Anaximander (together with Anaxagoras and Empedocles) derived plurality by separating the inherent contraries from their material principle. This principle he designates both as a mixture and as the One. He can do so because he assumes that the mixture of Anaximander is “in fact not a mixture but a homogeneous body in which the four simple bodies are qualitatively suspended through the alteration of each in the direction of its opposite. (...) by the inherence of these contraries in the One he means the potential inherence of the contraries in his chemical mixture; and by separation he means the actualization of these potential contraries”. McDiarmid sums it up (1970:199): “Theophrastus may with indifference speak of it now as a unity and now as a plurality, since regardless of the term he uses the result is the same: the Infinite is a unified substratum for alteration, and separation from the Infinite is simply that alteration”. The Unlimited is thus a plurality without being a mechanical mixture.

<sup>129</sup> It could also, as KRS (2004: 130) suggests, be ‘a vortex’, as some doxographers have spoken of, but the theory that Anaximander claimed the existence of vortex or swirl has largely been abandoned (KRS 2004:128). Another theory referred to by KRS is that of Vlastos’ (1947:171 n140) where the γόνιμον is a *process*, namely the process of separating the hot and the cold from each other after their being perfectly blended in the Unlimited.

This solution and interpretation I have suggested is a rather different one from those strategies which are ordinarily endeavoured<sup>130</sup>. The divide ‘separated out’ – ‘separated off’ is sometimes outright ignored<sup>131</sup>, and the term ἐκκρίνω read as genuine Anaximandean; alternatively the use of this verb in Anaximander is ascribed to Aristotle<sup>132</sup>, as Aristotle “was prone to read his own simple bodies, and two pairs of basic opposites, into everything, and he perverted Anaximander by substituting separating out for separating off from the Indefinite, thus making this into a mixture of opposites”<sup>133</sup>. An investigation of the frequency of the different phrases shows that it is indeed only Aristotle that uses the phrase ‘separated out’<sup>134</sup>. Further, ‘separated off’, ἀποκρίνω, is often considered genuine Theophrastean. For these reasons KRS (*ibid.*) says that “it seems quite likely that this [ἐκκρίνεσθαι] is a distortion of ἀποκρίνεσθαι“, and further that we have no right to assume as Aristotle did that the Unlimited for Anaximander was a mixture<sup>135</sup>. Is the dual use of separation-verbs, then, a case of Aristotle simply replacing one term for another, the other term meaning roughly the same but better suited Aristotle’s interpretation?

<sup>130</sup> The closest I have encountered is Hölscher (1970:291) who draws attention to the fact that “What ‘separates’ is not the opposites but the *gonimon*. This separation is not a splitting but a separating off. (...) ‘To be separated off’ (...) may be taken as Anaximandean”.

<sup>131</sup> e.g. Guthrie (1977:77, my emphasis): “The statement in Simplicius’ explanation that Anaximander accounts for the origin of things ‘by a separation of the opposites’, etc., depends no doubt on Aristotle, who writes (*Physics* 1.4, 187a20): ‘Others teach that the opposites are in the one and are separated out, as Anaximander says’”. We see here how the two forms of separating are equated, as the one count as evidence of the other.

<sup>132</sup> e.g. Hölscher (1970:294): “Aristotle clearly twisted Anaximander’s concept of *apokrisis* by putting it under his rubric of *ekkrisis*”.

<sup>133</sup> KRS 2004:129, referring to the explanation offered by U. Hölscher 1953, *Hermes* 81, 258 ff.

<sup>134</sup> The instantiations of ἀποκρίνω and ἐκκρίνω in the doxography on Anaximander are as follows:

Aristotle *Physics* A4, 187a20 = KRS 104; 118

“...the opposites are separated out from the One, being present in it...”: ἐκκρίνεσθαι

“...these, too, separate out the rest from the mixture”: ἐκκρίνουσι

Simplicius *Physics* 24,21 = KRS 119

“...but separation of the opposites through the eternal motion...”: ἀποκρινομένων

Pseudo-Plutarch *Stromateis* 2 = KRS 101C

“...from which the heavens are separated off, and in general all the worlds...”: ἀποκεκρίσθαι

*Ibid.*, = KRS 121

“...that which is productive of the hot and the cold was separated off...”: ἀποκριθῆναι

Hippolytus *Refutation* 1.6.4-5 = KRS 125

“...a circle of fire separated off from the fire in the world...”: ἀποκριθέντα

Hippolytus *Refutation* 1.6.7 = KRS 129

“... the finest vapours of air are separated off...”: ἀποκρινομένων

<sup>135</sup> As previously shown, there is a sense that we can assume that the Unlimited is a mixture, and that is in the sense of it being both a mixture and a homogeneous substance.

Let us then look at the use of the two verbs of separation in the doxographical tradition. We remind ourselves that what we are looking for is evidence that ἀποκρίνω was used to express ‘separating off’ the γόνιμον, or simply *the world*; and that ἐκκρίνω was used to express ‘separating out’ the opposites, or the things *in the world*.

(i) We see that (see note 134) Aristotle uses ἐκκρίνεσθαι for the process of generating things *in* the world, including opposites. Aristotle does not mention the γόνιμον or the generation *of* this world (at least not in *Physics* book II) and subsequently does not use the word ἀποκρίνω. (ii) Pseudo-Plutarch uses the term ἀποκρίνω in reference to the γόνιμον at the creation of the world, as well as for the separating off of the heavens from the Unlimited. This last use might well be shorthand for the entire cosmological process involving the seed and the fire and mist from it, and is then simply a repetition of the first use, but if not, it is just as compatible with my theory about the uses of the separation-verbs. (iii) Hippolytus uses ἀποκρίνω to describe both how the finest vapours of air are separated from the general air and in describing how a circle of fire came from the original fire generated by the γόνιμον (though Hippolytus does not mention the γόνιμον). Hippolytus’ use of the term fits well the suggested use where an originating principle or substance separates off that which is, through the process of separating off, not identical to the originating principle or substance, though it would be contained within this, in some potential state yet unrealised. E.g. the ‘finest vapour’ of air would be contained within the general air even though one could not actually identify these finest vapours inside the air, in their potential state.

(iv) Simplicius, however, uses ἀποκρίνω in the *opposite* sense, as the separation off of the opposites<sup>136</sup> in the world. In answer to this single piece of evidence diverging from the explanation suggested above, there is the suggestion that the specification of separation-types in the theory of the *apeiron* had been lost by the time Simplicius wrote his comments to Aristotle’s *Physics*, or was for some other reason unavailable to him. Though this might seem like a dishonest move in the interpretation of Anaximander, one has to remember that the doxographical tradition is so full of diverging theories and terms describing Anaximander that the theories on him has to evaluate the different doxographical evidence differently. To this argument there is also the fact that Simplicius speaks of “...some unlimited nature, from which *come into being* (ἐξ γίγνεσθαι) the heavens and the world in them...” (*Physics* 24, 17 = KRS 101A, my emphasis); in this context Simplicius employs a generic term of generation

<sup>136</sup> According to Hölscher (1970:290) “Simplicius has obviously smuggled in the separation of the opposites. What led him to do this is clear from the above: since on the whole he follows the Aristotelian interpretation of *ekkrisis*, he has combined this with his source, Theophrastus, where he also found the expression *apokrinesthai*. One should not underestimate Simplicius’ independence in the doxographical chapters”.

which suggests that he on this point possibly felt doubt as to how, exactly, to describe the generation of the heavens and worlds from the Unlimited. For why did he not use the term ἀποκρίνω to describe the generation of the heavens and the worlds in them, as he had done when describing the generation of the opposites? Why did Simplicius differentiate between generation of the opposites and generation of the world? The answer is already given; because they in fact were two different processes, and to this we add that Simplicius seems to have known or suspected it, even though he could not name both processes. In spite of Simplicius employing only one term for separation he did refrain from using it to describe the generation of the world. And even though the term he uses for generation of the opposites is the “improper” term, according to our theory here, he did not want to employ it to both cases of separation, and so used it solely for generation of the opposites. Theophrastus, upon which Simplicius bases his information on Anaximander, might have his own reasons for showing that Anaximander indeed spoke of the opposites, e.g. that his master’s interpretation of Anaximander to a certain degree relied upon him speaking of such, and Simplicius might for that reason have chosen to describe this process in detail rather than the generation of the world.

A further point is Simplicius’ claim that separation off the opposites happens “through the eternal motion”<sup>137</sup>. This eternal motion is invariably read as a circular motion of some kind, in order to preserve the eternity of its movement, and from the idea of a vortex or swirl generating matter (or primal bodies, or opposites), there follows the notion of ‘separating off’ as a function of the centrifugal powers of the swirl, rather than the idea of ‘separating out’. In a vortex of some kind that which is on the outer rim, i.e. the outmost parts, are separated off. Of course, that which is in the middle will *eventually* be separated by the centrifugal powers, but not *directly out*, rather *off* from the periphery. It could well be that it is this ‘eternal movement’ that Simplicius pictures or lends from Theophrastus which led him to use ἀποκρίνω for generation of the opposites<sup>138</sup>.

Hippolytus also speaks of eternal motion: “...motion was eternal, in which it results that the heavens *come into being* (ἐν γίγνεσθαι)” (Hippolytus, *Refutation* 1.6.2 = KRS 101B; 115, my emphasis). Again we have a doxographer that speaks of some non-specific form of

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<sup>137</sup> Ascription of eternal motion in Anaximander is more often than not today counted as a mistake of Theophrastus’, see e.g. KRS (2004:127-128), possibly stemming from a confusion of the atomists with Anaximander. The idea of the Unlimited needing some moving force other than itself corresponds poorly with the notion of the divine *arche* as an uncaused cause and the notion of living things being self-moving (Guthrie 1970:84).

<sup>138</sup> See also KRS (2004:132 n 2) on Anaxagoras’ use of the same reasoning to draw a connection between vortices and ‘separating off’.

generation, but this time it is connected with the eternal motion. Should he not, following the above argument on Simplicius, ascribe generation of the heavens to ἀποκρίνω as a result of the eternal motion? Comparison of the different versions of Theophrastus' *Tenets of the Natural Philosophers* in part 3.2.1 *The Unlimited as the origin* show us that there is some difference in and possible conflation of sentences, phrases and description of mechanisms in the doxographical tradition. If we expect perfect uniformity in the explanations we are sure to be disappointed. But the fact that Hippolytus does not speak of ἀποκρίνω, but rather leaves it undecided exactly how the heavens came into being, can be seen as a testament to the fact that Hippolytus have felt the same uncertainties or doubts that Simplicius did. Therefore he used ἀποκρίνω in a description where he felt safe to use it (see note 134 containing the survey on *apokrisis* and *ekkrisis*) and avoided it where there were uncertainties. For what was it that really was created by the eternal movement, was it the opposites in the world or the world itself?, Hippolytus might have asked himself, and then when no definite answer was found, he decided not to ascribe the generation by the eternal motion to any specific separation-type (even though he had to ascribe the generation *of* something to the eternal movement). The neutral and therefore safe ἐν γίγνεσθαι is used, I propose, to cover for explanatory uncertainty.

It has been shown, then, that the Unlimited is involved in two distinctly different operations: the ἀποκρίνω, separating off the seed of the world; and the ἐκκρίνω, separating out the opposites and other things of the world. This again shows that it is not (necessarily) so that the opposites generate and nourish each other and thus maintains the balance, the 'justice', of the world. Rather it is the Unlimited that creates everything and thus governs everything, as is clearly stated by Aristotle:

"...of the infinite there is no beginning... but this seems to be the beginning of the other things, and to enfold all things *and steer all*, as all those say who do not postulate other causes, such as mind or love, above and beyond the infinite. And this is the divine; for it is immortal and indestructible, as Anaximander says and most of the φυσιολόγων" (Aristotle *Physics* G4, 203b7 = KRS 108, my emphasis).

### 3.5.4 A survey on terms of causation

By examining the fragments on Anaximander we can conduct a survey of causal explanations, in order to tentatively establish what Anaximander implicitly considered were the (i) causal relata; (ii) the causal mechanisms; (iii) whether or not there were (causal) necessity in nature

or the laws of nature. Please note that the citations to follow are not verbatim citations; they are rewrites or abstracts made in order to highlight the significant points of the fragments. I have nevertheless stayed very close to the original wording and added the reference to where the original phrase can be found.

(i) Causal relata

The main difficulty in undertaking a survey on the causal relata of Anaximander's is that Anaximander himself did not explicate what type of phenomenon were such relata; did he count events, or bodies, or something else entirely as the causes and effects of connections in nature? Previously I have argued that Anaximander probably would count bodies [(?!)] as the relata of causation, and this conjuncture is mainly based on Frede's (1987:128-129) arguing that throughout antiquity *non-propositional items* (or 'entities') like Aristotle's 'ends' or 'forms' were mentioned when causes were discussed systematically. Until the Stoics revolutionized the ordinary language on causation by insisting that causes be 'active', what counted as causes where 'non-active' things in the world, entities.

Even Aristotle's 'moving cause' is an example of a non-propositional item because Aristotle says that it is not the sculptor that is the cause of a sculpture, but 'the art of sculpturing'. The same is found in Epicurus and Plato (1987:126) where 'the void' in the former and 'ideas' in the latter are counted as causes. Though I must admit difficulties in understanding ends or forms, i.e. strictly abstracted or nonexistent "items" that would only show up in language, as *entities*, such as Frede names them, the point nevertheless is clear: the Stoics, because they insisted of the active nature of causation, held that only bodies could be causes because only bodies (to them) are capable of acting, being efficient, interacting with other things. To us, causes can be called *happenings*, to the ancients, causes were those somethings (whatever they were) that are *not happenings*; they are still and inactive; if causes to us are *changes of states*, then their causes are *non-changing states*. These entities are non-propositional in that they are not propositions about events, or states, or changes of states. They are a given feature of the world and not a change in the world.

After the Stoic revolution even to them causes were still entities (they were 'bodies'), but the Stoics utilized the terminological distinction based on the original use of 'cause' which distinguished between an *aition* and an *aitia*. *Aition* was that which is responsible, thus the entity, *aitia* was the accusation, thus the explanation of the *aition*, according to Frede (1987:129). Hence the terms (often in other contexts only viewed as naming the same type of

causation, barring the difference of word-classes) could be used to identify both the ancient entity-causes and the more modern events-causes.

This indicates that if Anaximander would have explicated what were the causal relations, or at least what generally was said to cause things, he would have counted entities, non-propositional items. Given the somewhat unsophisticated view of substance (e.g. the lack of distinguishing between substances and attributes) in archaic Greek, and given that Anaxagoras is credited with invention of final causation, and furthermore how wholly unsuitable it is to ascribe to Anaximander any notion of 'form' or 'idea', I think it safe to assume that the substances of the world are effectively categorized under the term 'objects'. This categorization has implications of which I am not sure the validity; following Mann (2000) we learn that the Presocratics or more precisely the Pre-Aristotelians did not separate substances (things, objects) from the attributes that we today would say the objects have (or that which attributes necessarily are attributive to), meaning that 'the warmth of the sun' in some way must have been viewed as a *substance*, just like the hot and the cold were not viewed as independent qualities applicable to different sorts of substances either. The implication in question then is whether or not Anaximander would have agreed to the proposition that the warmth of the sun was an object. I think it follows from the above that he would agree, though nothing much depends on this question.

Of course, as in so many other instances, without the original wording one cannot be sure of Anaximander's intention. Also, the survey (i) cannot be properly understood unless undertaken together with survey (ii).

The *apeiron* (which is the source of coming-to-be for existing things; Simplicius DK12 A9); eternal motion; the earth remains aloft because of equidistance from everything; the fire in the world; moisture; the air; vapour; the sun; wind; clouds (clouds are only mentioned as effects); Hippolytus DK12 A11

The infinite is that which is beside the elements; an infinite source; the beginning of the other things and not other causes; Aristotle KRS 105; 106; 108

The earth is established in the middle, with a similar relationship to the extremes, and thus has no reason to move; Aristotle KRS 123

The earth is moist and being dried by the sun; Aristotle KRS 132

Living things were born in moisture, enclosed in thorny barks, and came forth to the drier part; Aëtius KRS 133

Man was born from creatures of a different kind; Ps-Plutarch KRS 134

Something capable of generating hot and cold; a sphere of fire; the air surrounding the earth; Ps-Plutarch DK12 A10

A part of the moisture was evaporated by the sun, and winds arose from it; Alexander, *Physical Opinions* fragment 23

The opposites are separated out from the One; Aristotle KRS 118

Innumerable worlds; Aëtius DK12 A14

It appears from this that the causal relata of Anaximander's natural explanations are properly understood as objects. The things named as leading to other things are indeed objects, no reference is made to other non-propositionals. Of the above mentioned causal relata I would dare that only one of them is *prima facie* not an object and that is 'equidistance from everything', or in Aristotle's words, 'a similar relationship to the extremes'. This however is from a sentence in which there could be some difficulty to decide upon what are really the causal relata, as one could also say that the relata in question is 'the earth'. The sentence reads 'because of equidistance...' hence the 'equidistance' is the *because*, which in many ancient analyses is identical with the *cause* (e.g. Aristotle). I believe the discrepancy can be resolved by maintaining that the causal relata of this sentence are 'the earth' and 'the extremes', or 'everything'. If the earth had been differently positioned in relation to the extremes, the extremes would have caused the earth to move. Given the present position the extremes cause the earth to *not* move. This is a case of *lack* of sufficient cause, thus somewhat obscuring that which easily could be named as the cause and the effect.

Eternal motion I too count as a physical phenomenon, hence an object, though it is certainly conceivable of as a (constant) change of state.

## (ii) Causal mechanisms

What are the processes and mechanisms that causation conceivably constitutes or are to be identified with? What kind of instances within the physical theories of Anaximander could warrant the term 'causation'?

The heavens and worlds are generated from some Unlimited which is the origin and element of things. Eternal motion generated the heavens. The earth is aloft because of equidistance. Stars are generated separated off (ἀπὸκρισις) from the fire in the world. Animals are generated from moisture. The lightest of vapours are separated off, the vapour is sent up from the earth by the sun, and from the vapour comes rain. Lightning is from winds which tears clouds apart; Hippolytus *Refutation* 1.6.1-7

Coming-to-be happen from infinite ages; Ps-Plutarch DK12 A10



The source of existing things is that which destruction also happens into, according to necessity, for they pay penalty and retribution to each other for their injustice, according to the assessment of Time; Simplicius KRS 101A

Motion was eternal, from which it results that the heavens come into being; Ps-Plutarch KRS 101C

The elements are opposed to each other and if one of them were infinite the rest would already have been destroyed; Aristotle KRS 105

Infinity [exists] because generation and destruction would otherwise fail; Aristotle KRS 106

The infinite is the beginning of the other things, for there is no other cause above and beyond the infinite, the infinite is also divine for it is immortal and indestructible; Aristotle KRS 108

A thing established in the middle, with a similar relationship to the extremes, has no reason to move up or down or laterally, and since it cannot move in opposite directions simultaneously, it will necessarily (ἀνάγκη) remain where it is; Aristotle KRS 123

The finest vapour of the air are separated off (ἀπόκρισις) and set in motion by congregation, rain when the exhalation that issues upward [to the sun] and lightning whenever (ὅταν) wind breaks out and cleaves the clouds; Hippolytus KRS 129

Whenever (ὅταν) it [wind] is shut up in a thick cloud and then bursts out forcibly, through its fineness and lightness, then the bursting makes a noise, the rift against the blackness of the cloud makes the flash; Aëtius KRS 130

Living creatures were born in the moisture, and they came forth to the drier part and lived a different life; Aëtius KRS 133

Man was born from other creatures, because man alone needs prolonged nursing; Ps-Plutarch KRS 134

Innumerable worlds are both brought to birth and again dissolved into that out of which they came; Aëtius DK12 A14

Something capable of generating the hot and cold was separated off (ἀπόκρισις) the eternal, and a sphere of fire grew from this and around the air surrounding the earth. Then this sphere was torn off and closed into circles; Ps-Plutarch; DK12 A10

The opposites are separated out (ἐκκρίνεσθαι) from the One, being present in it; Aristotle KRS 118

The elements change into each other, therefore it is not right to make anyone of these the substratum, but something else beside these; coming-to-be produces by separation off (ἀπόκρισις) of the opposites through the eternal motion; Simplicius KRS 119

The first living creatures were enclosed in thorny barks (φλοιοῖς), when the bark had broken off they came forth on to the drier part and lived a different kind of life for a short time; Aëtius KRS 133

A sphere of fire came from the *gonimon* and grew around the air about the earth like bark (φλοιόν) around a tree. When this sphere was torn off (ἀπορραγείσης) and closed up into circles, the sun and moon and stars came into being; Pseudo-Plutarch DK12 A10

There are several observations to be made from this. One is the difference between *apokrisis* and *ekkrisis* that I will later comment in full (see part 3.5.3 *A theory on ‘separating out’ and ‘separating off’*). Another observation is that the bark or skin (φλοιός) is at two different instances seen as a stadium between more permanent states, the breaking of the bark or severing of the skin marks the powers inherent in nature as they encounter each other and generate change in each other and/or their surroundings. Thus the bark marks a transitory state, the breaking of the bark an event of *causal significance*. In the one instance the bark is explicitly connected to the opposites, fire and mist. And it seems the opposites are always involved in causal statements, i.e. when the opposites are conceptually invoked upon; there is without exception some causal incident. This solidifies the causal abilities of the opposites, making them essential to their description as opposites (a point to which we shall return in part 3.5.8. *An analysis of the Unlimited continued*).

The cosmos of Anaximander is one of *blind mechanism*, or so the texts suggest. There are no ‘causes above and beyond’ the Unlimited, which is a physical substance of some indefinite kind, no ends or aims are specified, no causes outside of the purely physical. Here one has to consider what is meant by ‘they pay penalty and retribution to each other for their injustice’, and in the hereby view the expression describes the physical relation of opposites (including those existing things somehow based on the opposites), how these damage each other, as a result of their opposed powers, and how they pay damage for this later. Though the expression of this relation is in the form of metaphor, Theophrastus clearly saw that it was poetically meant, not literally. The ‘penalty and retribution paid’ by the things or opposites are not due to some divinely defined relation of justice, it is a metaphor for physical entities and how they physically relate to one another.

Further, there are clear references to *generality* in the primeval causation expressed by the above statements. The most explicit reference is the explanation of the earth at rest because of equidistance. Here is implied that for something to happen there has to be a sufficient reason for it, and if it does not happen the lack of reason explains why not. A more opaque reference to generality is that the causal explanations at least has ambitions of being explanations of *all things*: the greatest events (the generation of the world) and the flimsiest objects (the finest vapours of air), the most terrifying events (thunder and lightning), the living things (animals and humans), the non-living things (stars), the most basic of worldly objects (the hot and the cold) etc. Numerable references to infinity, the infinite and eternity also indicates some ambition to explain all things. A more clear expression of this ambition is the extant fragment with its claim that ‘the source of (all) existing things is that into which

destruction also happens’, drawing an unending circle of beginning and end for all things, thus expressing that all things are, in fact, caused (literally ‘sourced’). The natural law of balance expressed by the metaphor of the extant fragment has as subject to the law that which is subject to Time – which I take to be all existing things (except, of course, the Unlimited).

(iii) Causal necessity or non-necessity

Is the cosmos of Anaximander a determinate cosmos, a fatalistic, or an indeterministic? With what force does the law that he speaks of, work? Or does he not imply any necessary connections in nature, or in causation, at all?

According to necessity; for they pay penalty according to the assessment of Time; Simplicius 101A

He speaks of time, generation and existence and destruction being determinate; Hippolytus 101B

The *apeiron* contained the whole cause of coming-to-be and destruction of the world; destruction and coming-to-be happen from infinite ages, since they are all occurring in cycles; Pseudo-Plutarch 101C

[Of the infinite there is no beginning and this seems to be the beginning of the other things, say those who do not postulate other causes above and beyond the infinite; Aristotle KRS 108]

As we see, there are a few instances of Anaximander expressing some necessity in nature, in the laws of nature, and in time. While the only instance of the word ‘necessity’ is the extant fragment itself, there is another textual instance where it’s claimed that existence, destruction and time itself are limited or determined. The reference is on the whole somewhat obscure; it could be nothing but a complication of the original fragment where destruction and generation happens ‘according to the assessment of Time’, rather than addendum to it. It could however also indicate a deterministic consequence of Anaximander’s physical theory, though this determinism is not to be aligned with any form of final causation. The third fragment expresses that the Unlimited is the source of generation and destruction of innumerable worlds (i.e. generation of the world which happens infinitely), also that this happens cyclically. It also claims (as does the text of Aristotle’s in square brackets) that the Unlimited is the whole cause, that there are no other causes than this physical entity. This indicates that the physical causes are all causation there is (as seen above in (ii)), and that the physical somehow *must* occur as it happens eternally and cyclically.

There are no instances of Anaximander expressing non-necessity, chance or uncaused events. His cosmos is one of order and necessary connections.

But are we certain Anaximander did not intend any form of teleological or Fate-bound necessity by his frequently referred to κατὰ τὸ χρεών? Even though he did not have access to a sophisticated vocabulary concerning causation surely he must have meant something by using χρεών? The word means *what must be, what the oracles have stated* (LS). The authority of the oracles was not called upon lightly by the ancients. I will in the following evaluate two instances of the use of ‘necessity’ with reference to physical causation, in order to argue that Anaximander did not intend teleological necessity of nature.

(i) The earliest atomist Leucippus (born ca 475) stated that “nothing happens at random, but everything from reason and by necessity (ἐκ λόγου τε καὶ ὑπ’ ἀνάγκης)” (Leucippus, DK67 B2). This might seem contrary to atomism proper, which is purely mechanistic in its view on laws of nature<sup>139</sup>. But Taylor (1999:185) argues that the majority of the sources on Leucippus follow Aristotle in asserting that Leucippus by this denied purposiveness in nature, and argued that everything came to be through mechanical “necessity”. The concept of ‘reason’ in this sentence is not to be connected with a purpose, goal, or controlling Mind, but to rational explanation, ‘a reason’ (Taylor 1999:185-186). Hence what is expressed here is in fact the Principle of Sufficient Reason, to which we know the atomists were strongly committed. The second half of the sentence expresses determinism; linking rational explanation to causation and necessity.

(ii) Aristotle’s *Physics* II.8 opens with the following statement:

“We must now consider why Nature is to be ranked among causes that are final, that is to say purposeful; and further we must consider what is meant by ‘necessity’ (ἀναγκαίου) when we are speaking of Nature. For thinkers are forever referring things to necessity as a cause, and explaining that, since hot and cold and so forth are what they are, this or that exists or come into being ‘of necessity’; for even if one or another of them alleges some other cause, such as ‘Sympathy and Antipathy’ [or ‘Love and Strife’] or ‘Mind’, he straight away drops it again, after a mere acknowledgement.” (Aristotle, *Physics* II.8 198b10-17)

We recognize Anaximander, Empedocles and Anaxagoras as subjects of Aristotle’s critique in this statement. What he accuses them of is misuse of the word ‘necessity’; also he seems disappointed at Empedocles and Anaxagoras for not thoroughly developing their non-physical causes into proper final causation. Aristotle follows by asking whether we have any reason for

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<sup>139</sup> cf. Hankinson (1998:207-209); Taylor (1999:185): “The atomists’ universe is purposeless, mechanistic, and deterministic; every event has a cause, and causes necessitate their effect”; Vlastos (1971:163) claiming there was an important evolution in causal analysis between Leucippus and Democritus, namely that of necessary causes in Leucippus to just regularity of nature in Democritus. But these two atomists, which theses are so aligned that they are difficult, if not impossible, to tell apart, and sometimes both named as the originator of atomism, are more than likely not disagreeing on this important and significant point.

regarding nature as making any goal at all, or of preferring the one thing to another. He continues:

“Why not say, it is asked, that Nature acts as Zeus drops the rain, not to make the corn grow, but of necessity (for the rising vapour must needs be condensed into water by the cold, and must then descend, and incidentally, when this happens, the corn grows), just as, when a man loses his corn on the threshing-floor, it did not rain on purpose to destroy the crop, but the result was merely incidental to the raining?” (Aristotle *Physics* II.8 198a18 – 198b23)

To this the translator, Cornford, has added an explanatory note (my emphasis): “i.e. if we attribute the bad result (destruction of the corn) to *accident or necessity*, why attribute the good result (growth of the crop) to benevolence?”<sup>140</sup> Cornford, then, has made the observation I wish to underline. For Aristotle in his rhetorical question uses ‘necessity’ in the sense of ‘what had to happen given the structure of the world’. Thus Aristotle equates ‘necessity’ with ‘chance’. Please note that I am not arguing that Aristotle *himself* equates necessity and chance. What I am arguing is that Aristotle claims that certain Presocratics (one of whom is Anaximander) used ‘necessity’ like Aristotle ‘chance’; something that happens for no purpose. In the very next line Aristotle writes “So why should it not be the same with natural organs like the teeth? Why should it not be a coincidence that the front teeth come up with an edge, suited to dividing the food...” He later answers “...it is impossible that this should really be the way of it. For all these phenomena and all natural things are either constant or normal, and this is contrary to the very meaning of luck and chance” (198b34-199a). In the remaining chapter Aristotle consequently uses coincidence or chance to contrast purpose. We remind ourselves that in the beginning of the chapter it was *necessity* Aristotle argued against, but it soon changed into *chance* as if they were interchangeable.

And interchangeable they are, if and only if one by ‘necessity’ means something like ‘what must happen according to some pre-established, antecedent state of nature’; blind mechanism, without purpose.

The sense of ‘necessity’ in these examples (i) and (ii) is clear, then; nothing happens necessarily because of *what will come*, but must happen because of *what has been*. It is the nomological structure of the world that correlates events in it, and not its ends or aims or the maker of this world. This corresponds well with Anaximander’s theory, I think; while the Unlimited is the maker of the world it is nowhere expressed that this *arche*-element has a will or a purpose or a plan with this creation.

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<sup>140</sup> 1996:170 note *a*

As to the existence of chance events we can add that The Principle of Sufficient Reason (presented in chapter 3.2.3; 3.5.1) does not allow for such, as already stated in connection with Leucippus. If we, then, allow that Anaximander also held that principle he could not consistently have argued the existence of pure chance events. If one by ‘chance events’ refer to events to which the cause is *not known*, rather than they not having a cause at all, then chance events will be consistent with the Principle. But Anaximander left no statements or arguments about epistemology, and while e.g. the atomists possibly spoke of chance in this manner<sup>141</sup>, there is no evidence of Anaximander holding an opinion like this. Epistemological concerns were not part of the philosophic agenda until the scepticism of Xenophanes<sup>142</sup>.

It appears, then, that the laws of nature of which Anaximander spoke have an element of necessity, but this is not the necessity of teleology or that of Fate. Rather it amounts to a somewhat unsophisticated use of the word ‘necessity’, the intent being ‘what happens according to natural laws’ or possibly the stronger ‘what must *inevitably* follow given antecedent states’, the latter sentence implying physical determinism, the former implying regularity in nature and hereby the existence of natural laws.

### 3.5.5 The causal meaning of multiple worlds

How does the question of multiple worlds relate to causal analysis? I have devoted considerable space in this essay debating whether or not Anaximander may have claimed multiple, successive worlds. The reason I have done so, is that, as stated earlier, methodical statement concerning random creation and destruction will implicitly exhibit some notion of causality and causal structure, thus being pertinent to the analysis of causation.

I have so far established that Anaximander more than likely argued multiple successive worlds. The very notion of multiple worlds leads the mind to the notion of possible worlds (at least my mind is led so), but these must not be confused. The multiple worlds of Anaximander (and of the atomists) were physical worlds, as real as this our world (to the

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<sup>141</sup> I am here referring to the atomists’ claim that the creation of the worlds from the vortexes happened by ‘necessity’, but the vortexes themselves happened ‘by chance’. Aristotle ridiculed them for this, but ‘chance’ in this respect might mean that the causes are epistemically unavailable to us, not necessarily that there are no causes. See also Taylor (1999:185-186).

<sup>142</sup> Cf. Hankinson (1998:26; KRS 186)

atomists they were actual worlds as well, though Anaximander had to wait for them: to him they were successive in time).

These multiple (or innumerable) worlds, then, can be identical or they can be non-identical. The notion of innumerable identical worlds sounds intuitively as that of Nietzsche's 'eternal recurrence'; the causation of these worlds must be one of fatalistic determinism<sup>143</sup>. As we have seen, though Anaximander employs the term *χρεών*, he does not appear to be fatalistic, though a certain mechanistic determinism appears to be reasonable to ascribe to him. A notion of innumerable non-identical worlds might then seem more suitable. This, however, depends on what we mean by 'innumerable non-identical'. If there will be generated worlds for all eternity and none of them will resemble each other, there must be some reason for this, and a good one at that, we might add. In such a universe it may seem as though causation is near to non-existent; the connections of events in the world random and unpredictable. This would amount to indeterminism, a position we can be certain Anaximander did not entertain. However the difference or non-identity between the multiple worlds does not depend on there being no connections in nature (and thus no causation). All that is needed in order to ensure difference of worlds is that the initial conditions of worldly generation are different each time. What we know of Anaximander does not directly invite a speculation on the conditions of each worldly generation. If that interpretation of Anaximander claiming that 'the eternal motion generates the worlds' is followed, there is obvious possibilities of each world being generated under somewhat different circumstances. If, let us say, the worlds are separated off from the periphery of the vortex that is eternal motion, then each point on that periphery could separate off a new world, under slightly different circumstances than the last (the points of the circle being the different circumstances). I am not entirely confident that this would last for all eternity; it seems that the circle would be completed and the worlds would resemble each other again, and in that respect we are back in the eternal recurrence. The dangers of arguing from negation well in mind, I would think that if Anaximander really had such a spectacle as eternal recurrence in mind, he would have said something on it, or indicated it somehow. But it does not show up anywhere in the doxography.

Would such identical innumerable worlds follow from a notion of causation as necessary connection? Let us start in the other end: Since Hume the notion of *necessary connections* in causation has been criticised, it is rarely argued in contemporary causal

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<sup>143</sup> as Nietzsche indeed argued; the Greeks invented 'free will' in order to provide better entertainment for the gods, for in a deterministic world the gods always knew what would happen, he reasoned.

analysis<sup>144</sup>. To the ancients there were no Hume and no such misgivings about necessity in nature, as we have seen from Anaximander's (and Empedocles' and Anaxagoras') frequent use of 'necessity'. The position of 'causal realism' was one not yet explicated or discovered; it (we must assume) was the natural position for the ancient Greeks to view causation and natural connections from. We can therefore argue that there was no denying of the necessity with which the effects followed their causes in natural sequence. To support claims of this kind, we have such stories about causal development as we have seen earlier:

There is the reverberation of cosmic necessity in the early Greek idea of human fate, and the reverberation of human fate in the Greek conception of cosmic necessity (...) When finally the concept of physical cause emerged, it contained two elements (...): the *productivity* of the cause, and the *necessity* with which the effect follows upon the cause." (Cerf 1942:169)

Having established that there was necessity in causation to the ancients, then, we can ask of what sort was this necessity? In this context we distinguish between analytic (or logical) necessity and metaphysical necessity. Though there are many other forms of necessity (nomological, epistemic, moral<sup>145</sup>, contingent<sup>146</sup>); neither of these seem fitting to the subject at hand. Vlastos (1971) holds that to Plato in the *Phaedo* the causes are *analytically* necessary to their effects; "...he is implying that the laws of nature, could we but know them, would have the same necessity as do the truths of arithmetic and logic", (1971:162). What supposedly motivates Plato to such extremes of necessity in causation is the theory of Forms being responsible (the cause) of something in something, e.g. 'the beauty of the beautiful is because of the Form of Beauty'. There are certainly no Forms in Anaximander, and, it appears, no other reason either to ascribe to him the position that causal necessity equals analytical necessity. Hence, by default, it seems that we should apply *metaphysical necessity* of causation to Anaximander. We rest at this statement for the moment.

Let us return to the multiple worlds and their apparent identity. It seems we might rephrase the question that we raised concerning causality for the identity of the worlds; is it an analytical (logical) identity or a metaphysical? If there is analytical identity between the worlds it appears that we would not even be trapped in eternal recurrence; for from the vocabulary of possible worlds we know that two worlds of absolute identity cannot be two

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<sup>144</sup> The notion has had a certain renaissance since the 1970's, before that it was next to unheard of to claim anything stronger than regularity in causation (cf. Psillos 2002:159 ff).

<sup>145</sup> cf. Taylor, Kenneth, 2000. *Truth & Meaning*, Bodvin, Blackwell Publishers, pg 185

<sup>146</sup> cf. Psillos (2002:161 ff)



different worlds: it is the same. Now, the worlds of Anaximander of which we speak are not the possible worlds of modal logic, they are actual physical existent worlds. Hence the argument that identical worlds would not be different worlds, but the same, cannot be applied without some adjustment. An adjustment to this, then, is to argue that analytically necessary connections in causation would lead to one and only one world; whether that world is destroyed and recreated cyclically, well, that is simply a metaphysical question far beyond anyone's ability to confirm or deny. It is a question concerning not the laws of nature and causation, but what happens outside of time, outside the laws of nature and *outside causation*. From an analytical necessity in causation, then, it seems there follows the existence of one world alone.

It seems, then, that we at this point are left with a physical determinism in Anaximander that makes causal connections necessary, possibly with the strength of analytical necessity, such as it would make the multiple worlds identical, resembling the 'eternal recurrence' of certain philosophers. We have however grave misgivings about this conclusion, as the eternal recurrence is never indicated in the doxography, the analytical necessity of causation is wholly without independent foundation, and further the possibility that the entire interpretation of multiple worlds is unfit, as the causation analysis seems to indicate the existence of one and only one world.

To resolve these difficulties we shall further analyse the causation, and participants of causation, implied in Anaximander's theories.

### **3.5.6 An analysis of the Unlimited<sup>147</sup>**

Let us now look to Anaximander's analysis of causation in a manner that, while it was unavailable to Anaximander himself, can serve some enlightening purpose for us concerning the implications of this very early philosophical notion of cause.

An analytical reading of Anaximander suggests that if the Unlimited is understood as the material substratum, as pure substance, the Unlimited is either unable to or hampered in its ability to exhibit causal powers. (I have previously drawn attention to the fact that Pre-Aristotelian philosophers did not separate substance from quality. I will however in the following analysis distinguish between the two in order to execute the analysis by use of modern philosophical vocabulary, which distinguishes between objects and attributes in some

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<sup>147</sup> For the chapters on analysis I am greatly indebted to discussions with Jim Westin; at the time a fellow student at Oslo University, presently at UBC.

significant ways. I shall of course take heed that this separation of categories is one of our concepts alone and not attribute it to Anaximander unless there present itself some reason why Anaximander should be interpreted so.)

The argument to this effect springs from the notion of the Unlimited as a substance of inexplicable nature. The *aperion* is as described earlier wholly without limits, and is thus description as ‘unlimited’, ‘boundless’, ‘eternal’ etc. The attributes ascribed to the Unlimited are those that follow from the limitlessness, namely (i) immortality, (ii) divinity, (iii) spatial endlessness, (iv) temporal eternity, and (v) undifferentiation.

In short, attribute (i) is usually<sup>148</sup> ascribed to the Unlimited because first, an *arche* serves as the first cause and thus must be uncaused, and second, it is the permanent ground for the existence of all things; (ii) is usually ascribed because of the Unlimited’s vastness and eternity<sup>149</sup>, and is as such reducible to the sum of (i) and (iii), but also the fact that it ‘steers all things’<sup>150</sup>; (iii) is ascribed because, first, the Unlimited is supposed to be the source of coming-to-be eternally, second, to be limited externally means to encounter something else<sup>151</sup>; (iv) is a less anthropomorphic description of (i), having neither generation nor destruction, thus being untouched by (or outside of) time; finally (v) follows from having no internal limits and thus no distinguishing features, that is, no manner of distinguishing features from each other, should there be any.

In spite of the identification of attributes with substances, there seems to be indications that the Unlimited was in some contexts understood as a substratum, possibly by Anaximander himself. The Unlimited is as previously stated too primal for the categories of ‘mixture’ and ‘fusion’, and is as such neither and both simultaneously. However, the Unlimited is often described as being ‘One’, always referred to in singular, and spoken off as ‘without inner boundaries’, implying that it should be viewed as a uniform fusion and homogeneous substance, rather than as a mixture, i.e. a heterogeneous substance. As a

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<sup>148</sup> Here I rely, in part, on the arguments of Dancy (1989) claiming that there are in fact several reasons for ascribing several kinds of limitlessness (or unlimitedness) to the Unlimited. I use the term ‘usually’ as other scholars often simply extract all these attributes from the name ‘*apeiron*’ without much further independent argumentation, yet many of these reasons appear at other points in their interpretation of Anaximander.

<sup>149</sup> “At all events Anaximander seems to have applied to the Indefinite the chief attributes of the Homeric gods, immortality and boundless power (connected in his case with boundless extent)...” (KRS 2004:117).

<sup>150</sup> Aristotle *Physics* III.4.203b8-16: “...the unlimited (...) appears to be the origin of other things and to encompass all things and direct all things (...) and this they say is the divine, for it is immortal and imperishable, as Anaximander (...) call it.” To Guthrie (1977:88) the directive or governing power also implies “at least some form of consciousness” which combines cumulative to him with the claim that the *apeiron* is alive to the effect that the *aperion* is divine. Opposed this there is Vlastos (1952:113) which claims that “there is no good conclusive evidence that either Anaximander or Anaxagoras called their cosmogonic principle ‘god’ or even ‘divine’”; Vlastos further ascribes this interpretation of Anaximander to Aristotle.

<sup>151</sup> Guthrie (1977:84).

homogeneous substance without distinguishable features it resembles, if it not in all practical aspects really *is*, the ‘substratum’: pure substance, without attributes, qualities etc.

A substratum without attributes will have *no causal abilities* given that causal abilities are dependent on what attributes something has, i.e., the causal abilities of something is dependent on that something’s particular set of attributes, to which we ascribe other abilities as well. Hence, in this world we must conclude that pure substance is without causal abilities and can not participate in a causal relation, i.e. be a causal relata. This would leave the Unlimited as unable to have causal powers.

A more advantageous evaluation of the Unlimited is gained through the use of possible worlds, where the analysis comes out somewhat differently. And here I read the Unlimited more as both a homogeneous fusion and a mixture of parts; i.e. a substance with some *content*. A homogeneous substratum owes its homogeneity not to any content, attribute, or quality of this, but to some essential feature of the homogeneous substratum itself. To clarify this: The substratum-substance is homogeneous and without differentiable attributes and qualities of attributes. We can formulate this as having no distinguishable content. Given the unique nature of the Unlimited, any content attributed to the Unlimited must, in order for it to become part of the Unlimited, become undifferentiated again; it must lose its distinguishing attributes and become an undistinguishable part of the fusion. Hence the content we have established that the (fusion-and-mixture) substance has would not be essential to the homogeneous substance. If it is not essential, i.e. necessary, it is contingent. Any content of the homogeneous substance, then, would be a contingent relation; only the homogeneousness of the Unlimited is necessary and essential. Given the dependency of causal abilities on contingent attributes we must conclude that the Unlimited is only contingently possessing causal abilities and not necessarily.

This contingency is of course sufficient for our present world and would become an explanatory problem only if Anaximander had stated that the multiple worlds were possible worlds; then, in at least one of these worlds, the Unlimited would not possess causal abilities and would not be able to generate that world or the opposites. Given that Anaximander claimed multiple successive worlds only in the *physical* sense, all the worlds are subject to the same laws or mechanisms and so the contingency is sufficient. This, however, indicates that Anaximander’s Unlimited is not sufficient for explaining the existence of the universe and the laws that apply in it if Anaximander would want the innumerable worlds to be created by necessity. We have already established that causation and generation happens with necessity in Anaximander’s theories.

So what, then, could Anaximander use in addition to the Unlimited to explain the necessity of the coming-to-be of the worlds? One suggestion would be the ‘cosmic justice’ many interpreters have seen expressed by the extant fragment and the doxographical reports. But this suggestion, or so I think, will not lead us far. Firstly, the ‘cosmic justice’ must be one that operates *within* the cosmos or universe and so will not be able to operate “from the outside” of this universe. For in that case it would be a justice for *kosmoi* to follow and not one particular cosmos’ justice. Secondly, there is little argumentative ground for claiming that according to some definition of ‘justice’ the Unlimited is compelled to generate worlds. For why would not creating worlds be ‘injustice’? That presupposes that the Unlimited in some way has obliged itself to creating worlds, that in a modern judicial manner of speaking it has signed a contract for the unending generation of cosmoses, and there is no textual ground in the doxographical tradition, nor contextual ground in the cultural setting, nor analytical reason to be abstracted from the terminology to imply that kind of commitment. Also workings against this suggestion is the function of the term *adikia*; there has been shown previously in this essay (see part 3.4 *On justice*) that *adikia* at the time of Anaximander was employed in manners of property law and economic behaviour. But there is neither property nor economics to dispute over here, no illegitimate gains or claims to ownership to dispute. Only if the Unlimited has some debt that will be honoured by creating worlds will this correspond fittingly, or so I think. Finally there is the generally agreed upon notion that justice is made towards the Unlimited or between the opposites generated from the Unlimited, which means that justice is indeed what the Unlimited demands, and not a demand towards the Unlimited.

Another suggestion would be that it is the ‘Time’ of the extant fragment that somehow compels the Unlimited to generate worlds. For while the Unlimited is eternal and undying, that does not necessarily imply that the Unlimited is situated outside of time (neither spatially nor temporally), or that it in some way transcends time; it could merely mean that it exists *eternally within time*, in the sense that as long as there is time, there is the Unlimited. This implies that demands or laws put forward by Time could be said to apply to the Unlimited as well, even though it has a unique ontological and metaphysical status. If this idea feels strained one might find some relief in the fact that to Anaximander Χρόνος was not just ‘time’ but also a god, and one of the first gods at that<sup>152</sup>, witnessing to its power. But this is not very convincing. For what demands would Time make of the Unlimited in reference to

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<sup>152</sup> Chronos was youngest and most important of the Titans, son of Ouranos (Heaven) and Gaia (Earth), husband of his sister Rheia and father of Zeus and other deities (cf. Hesiod, *Theogony*).

generation of the worlds, and why should Time make these demands? More importantly, why should we declare Time to be the ultimate cause of creation, especially without further arguments or evidence to establish Time as primary? It seems that if we apply this foundationalist-sounding end to the ‘why’s we might as well apply it onto the Unlimited itself and merely state that the Unlimited just happens to create (for some reason), and that this happenstance ensures the causal abilities of the Unlimited even in the cases where causal abilities are not *necessarily* present. Furthermore, it has been shown that Time assesses the time-limit for payment of reparation for injustice – it does not make demand to actions (especially no actions which in themselves are thought of as unjust, as e.g. the creation of the worlds are, according to some interpretations). Finally the status of the Unlimited seems also to implicate that in fact does exist outside of and independently of time: “he talks of Time as though coming-to-be and existence and destruction were limited” (Hippolytus Ref 1.6.2 = KRS 101B) and as we know, the Unlimited is not limited, by Time or otherwise.

A third way of accounting for the necessity would be to argue that creation indicates some sort of lack, or want, in the creator. What, then, does the *apeiron* lack that it wants or needs to realize or create through creation? The answer gives itself: The Unlimited lacks limits<sup>153</sup>. One is here faced with the question “why would the *apeiron* want limits?” and the answer must be related to why we say that creation indicates a lack of something. Clearly, what is perfectly situated and lacks nothing is self-sufficient, what is self-sufficient does not want nor need anything, and would not need to create anything. This is close to a tautology. On the other hand, to the Greeks the act of creation could also be explained as an overflow of what is good, or of power, or that it is the natural act of perfect things<sup>154</sup>, presupposing that creation in itself is something good. Unless that which creates, creates something identical to itself, that which is created must be somehow significantly different than the creator. In our case, that means limited. That *limits* does not seem to be something desirable, something that one wants to create, may be, but we shall take heed to the fact that it is not for itself these limits are created by the Unlimited, but for the existing things which must have limits (“...if one of those were infinite the rest would already have been destroyed”, Aristotle *Physics* III.5, 204b22 = KRS 105); and also that what *we* find desirable does not concern something as non-

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<sup>153</sup> A related reasoning we find in Seligman (1974:115) where he writes that the *apeiron* is the source of existing things, and all existing things are in their essence limited, as the *apeiron* is in essence unlimited. Hence nature is the sum of all existing things which are “characterized in terms of their limited existence and power, i.e. by reference to their πείρατα, their limits” (1974:118). In this interpretation *adikia* then has to do with the transgression of limits for the things in the world, and the *adikia* is committed against the Unlimited.

<sup>154</sup> As in e.g. Plotinus *Enneads* V.4.1; Plato *Timaeus* 29e.

anthropomorphic and in all manners *alien* as the divine, eternal and undifferentiated Unlimited.

Finally, Guthrie (1977:91) suggests that the *apeiron* creates simply because it is (eternally) alive. The main reasons for ascribing life to the Unlimited appears to be first the biological analogies used in the cosmogony (the seed, the bark, the hot and the cold), second the eternal motion of the Unlimited. And, Guthrie writes (*ibid.*), since for the Greeks life meant self-caused movement, no eternal cause was necessary for the *apeiron*'s eternal motion. While Anaximander rejected the anthropomorphic notion of sexual mating so frequent in mythological cosmogony, he still explained the origin of the world in biological and embryological terms. It appears, then, that Guthrie draws upon the Greek idea that any mature biological entity will procreate, and for this no further explanation is necessary; it is what living things do. While I have defended the embryological analogies earlier in this essay, I am not convinced by Guthrie's argument. First, it appears that the biological character of generation from the Unlimited is to explain the Unlimited's status as living being, which again is supposed to support the biological character of generation from the Unlimited. One might claim this is not a case of explanatory circularity but rather a hermeneutic circle; the parts are explained by the whole which again explains the parts. But biological creation from non-living entities is as previously argued quite possible, if only metaphorically, and there is little further evidence of the Unlimited being considered a living being. It has not been claimed in this essay that the Unlimited is alive, but that *the world* is so.

Here it can be argued that in ancient thought it was common to suppose that the crucial properties of the effects must be in some manner present in the causes. So could Anaximander have stated or implied that a living entity could be generated from a non-living? I give here three instances of textual support for that claim: (i) Pseudo-Plutarch (*Stromateis* 2 = KRS 134) states that because "man alone needs prolonged nursing" and that "other creatures are soon self-supporting", mankind was born from "creatures of a different kind". Fairly enough this is an example of a living creature giving life to another living creature. The crucial property that is transferred here is 'life'. The property 'self-support' however is not transferred. This tells us that in the least case, all properties, even those we select in order to describe the object (those essential to it), need not be transferred by generation or by other causal connections. (ii) Aëtius (KRS 133) states that "the first living creatures were born in moisture" and that they were "enclosed in thorny barks". The 'enclosing bark' (φλοιοῖς) we recognize from the generation of the earth together with the heavenly bodies, and more importantly the embryological vocabulary frequently applied by Anaximander. It is not the

bark that grants life. What is it, then? It appears we have to conclude either (a) life arose *spontaneously* in the moisture (presumably the moisture mixed with earth, i.e. mud), an assumption to which we can imagine some empirical support from observations by Anaximander of the microorganisms, plankton etc. living in the mud of dried-out ponds and shorelines; or (b) life actually arose *because of* the moisture or mud. This ‘because of’ could be intended either widely or narrowly; it could be intended as ‘the efficient cause’ or as ‘one concomitant factor out of many’, or something between these polarities, that led to life arising in mud or moisture. Independent of the wideness intended by this ‘because’, I prefer conclusion (b). The two reasons for preferring this interpretation is first that Anaximander has barred chance events. There are no such things as causes without explanation or events without causes. This follows from, among other things, the Principle of Sufficient Reason. Second, as we have seen (part 3.3.5 *On the opposites*) moisture was considered the nourishing element *par excellence*. This indicates that it was no accident that the animals was given life in the mud, indeed, they were given life from the mud, for that which nourishes is also that which gives life: ‘like nourishes like’. We can also easily imagine that this represents the heritage of Thales, Anaximander’s master in philosophy, which said that all things come from water, “perhaps taking this supposition from seeing the nurture of all things to be moist” (Aristotle *Metaphysics* I.3, 983b6 = KRS 85).

(iii) In Hippolytus (*Refutation* 1.6.1 = KRS 136 = DK 12 A11) it is stated that “animals are generated *from* moisture evaporated by the sun” (my emphasis). The moisture in question is not the part of moisture that has evaporated and become wind and air, but the moisture that is left on earth from this process, namely the sea and its surrounding wetness (the mud on the shores etc). Here Anaximander is reported to make the claim that it is indeed *the moisture* that generates the animals, and that this was not a process which accidentally or not took place merely within the mud.

These interpretations of the fragments shows, then, that Anaximander did not claim that all crucial or essential attributes had to be transferred from cause to effect, and that life could indeed arise from something that was not living: the moisture, assumingly with the concomitant factor mud, or earth. This mud or earth could not have been granted a more significant explanatory role as it is only in the subtext of the fragments it appears; the element that is named by all reports on the generation of life is ‘moisture’.

Further, the Unlimited seems to qualitatively undifferentiated to be considered living, or even moving or containing movement. That biological, embryological<sup>155</sup> and more mundane analogies were drawn to explain grand cosmological themes seems to be a typical Anaximandrian trait. For instance, the statement that the heavenly rings have holes “like the nozzle of a bellows”, that “the earth is like a stone column” (which actually were mundane objects for polis-dwelling Greeks), and that the cosmological fiery sphere forms around the moist earth like “bark on a tree”. Again; I have previously compared the world with a living being, with an embryonic birth, a lifetime and a death, but do not believe that the Unlimited was seen as a living thing as well. I think the biological explanation of the earth (and every living thing) in Anaximander shows exactly that ‘life’ to the archaic Greeks meant ‘birth’, which again meant having *a parent* of some kind. Even the gods had parents of some kind – except Chaos, which literally means ‘the abyss’<sup>156</sup> and thus was the state that existed prior to life. If there is any mythological predecessor of the Unlimited for Anaximander to rationalize, it is this lifeless void Chaos.

Against the second of Guthrie’s reasons I again wish to point out that eternal motion in Anaximander is more than likely a mistake; something attributed to him because no other cause for creation was stated, and possibly as the result of conflation with the Atomists because of *other* explanatory likenesses (multiple worlds, the Principle of Sufficient Reason, materialism, Leucippus’ cosmogony referring to of an ‘amalgam’ surrounding the earth<sup>157</sup> etc.).

It appears, then, that we are at an impasse; if there really is such a force in causation as to ensure that worlds are generated *by necessity in all possible worlds*, i.e. with analytical necessity, we cannot find it, or the grounds for it. Hankinson’s (1998:17) suggestion that what powers the cosmic cycle can remain unexplained without explanatory structural difficulties for Anaximander, represents one attempt of freeing ourselves. The other which I hereby suggest, is to conclude that there is no such analytic necessity in Anaximander’s causation. We are again left with the metaphysical necessity.

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<sup>155</sup> Baldry (1932:28): “Obstetrics is one of the oldest of the sciences, and those who practised it even in the earliest times must have formulated some conception of the process by which the foetus developed. But (...) interest in birth and other phenomena connected with sex is a regular feature of primitive societies long before other aspects of biology are even thought of”. This goes to show how common and primary the embryological references were in cultures of very early scientific thought.

<sup>156</sup> *Theogony* 116

<sup>157</sup> Digones Laertius IX, 31 = KRS 563 = DK67 A1



I have now evaluated the Unlimited as a material substratum in the actual world, and as a mixture-fusion with (contingent) content in possible worlds. Before I evaluate the Unlimited as mixture-fusion with content in the actual world, I will extend the analysis to ‘the hot’ and ‘the cold’.

### 3.5.7 An analysis of the hot and the cold

‘The hot’ and ‘the cold’ are by their descriptions implied to be *attributes* and not substances (again, this separation into categories of ‘attributes’ and ‘substances’ in order to help the analysis, not to project one such separation onto Anaximander). If that is so, I argue that causality can be perceived of as primary in the physical world.

The argument to this effect is that corresponding to any entity (object, substance, power) there are several (if not unlimited) sets of attributes that could be applicable to describe it. That set of attributes that we distinguish or select in order to describe ‘the hot’ and ‘the cold’ in their function as generative of the worlds, are those attributes that have *causal abilities*. Hence causal abilities are *essential* to ‘the hot’ and ‘the cold’; those abilities that can be considered causal or as participants in causal relations are not consequences of ‘the hot’ and ‘the cold’s abilities, they are what we use in order to discern the relevant abilities, traits or characteristics, thus making it possible to speak of them.

The lack of separation of attributes and substances means that Anaximander would speak of ‘the hot’ as ‘a hot substance’, and not as a substance that has the attribute ‘hot’, any further attributes does not in this context apply<sup>158</sup>. This again underlines the primary status of that particular attribute (in our conceptual language) or type of substance (in the archaic’s language). Again, it is the *function* of the opposites that determines their description; their function as causal participants is somehow essential to them (because they are invariably connected to such, as we have seen), which also determines what kind of substances they in fact are. From this one must conclude that an object is identical to the attributes that are predicated of that object. This means that the attributes of any object are necessary, (in all possible worlds, we might add). It cannot be the case that the object described as ‘the hot’ is ‘the lukewarm’ in another possible world, because that would not be the same object. To the archaic Greeks, then, attributes are necessary, either as metaphysical necessary or even

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<sup>158</sup> What I mean by this is that ‘the hot’ might have several other attributes invariably connected to hot substances, e.g. dryness, wood-burning, bonfire-making etc., but none of these matter in this particular context. The only attribute that matters in this context (of causation) is the attribute considered primary; *hotness*.

stronger; analytically necessary<sup>159</sup>. Again it seems inappropriate to apply to Anaximander any implications of analytical necessity, because we lack any implications in Anaximander to the effect of things in the world being not only logically necessary as they are, but logically necessary in themselves, i.e. having to exist by laws of logic. The notion of attributes being determining for the substances being the substances they are, is on the other hand a clear-cut instance of metaphysical necessity (which does not obligate the existence of things, only that *if* they exists, they are such and such).

Analyzing the Unlimited in part 3.5.6 *An analysis of the Unlimited* I stated that causal abilities, along with several other abilities, were dependent on attributes. In the above I have stated that causality is primary. This, I argue, is not a contradiction, as the statements are combinable in what may be called an explanatory loop: the attributes of any object are primary to the identity of that object; in claiming an object has causal abilities one selects those attributes contextually (causally) relevant, thus determining of the object in question. Causal abilities are dependent on certain causal attributes (e.g. being a body). Hence causality both depends on other attributes and determines what can be attributed of an object with causal ability. Being primary in this manner, it appears that causal ability itself is an attribute, being *aitios* (culpable, causing, responsible for), and, as an attribute, it is metaphysically necessary. The attribute in question can be stated to be a primary one, determining other attributes and abilities. That primary attribute would then give the reason for causal connections being objectively necessary; it is an attribute that objects necessarily have, like physical dimensions or velocity.

This would explain the explanatory loop: causation is so primary that it cannot be spoken directly of in non-causal terms. In other words, causation is has an independent, real and non-reductive existence. This position is central to causal realism, where the events of nature are connected causally by objective necessary connections.

To this I add that ‘the hot’ and ‘the cold’ are the only substances that invariably are connected to causal contexts, thus these opposites (through connection to primary attributes) are somehow perceived as primary substances, from which or upon which other substances has their existence.

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<sup>159</sup> Metaphysical necessity being that kind of necessity with which an individual (or property) is identical with itself. Metaphysical necessity is thus defined by the *essential properties* of objects.

### 3.5.8 An analysis of the Unlimited continued

Let us return to the analysis of the Unlimited, then. What we have left to consider is the Unlimited viewed as a mixture *and* as a fusion (i.e. an undifferentiated substance that has a certain set of attributes, and not the material substrate), in this actual world. We are now able to forward some propositions about this Unlimited, causation as such, and the multiple worlds.

First, the attributes of the Unlimited are seen as primary and essential; this follows from the above arguments on metaphysical necessity of all attributes, but also, the unique ontological position of the Unlimited. Being e.g. undifferentiated is essential to the Unlimited not just because all attributes are so, but because the unlimited source of matter cannot be differentiated.

Second, causal abilities are primary and metaphysically necessary, thus the Unlimited, since it has the (causal) ability to separate off the *gonimon* and separate out the opposites, is essentially causally empowered. No amount of possible worlds is able to undermine this ability of the Unlimited; therefore, the Unlimited generates worlds and opposites out of metaphysical necessity.

Third, the necessity of causation in the world is one of metaphysical necessity, as are the laws of nature. If existing things are to maintain their identity there must be necessary laws and certain relations between them, the argument goes.

How does this, then, pertain the multiple worlds? We have earlier asked in what sense the worlds can be considered identical. The above suggest some strong form of metaphysical identity between the worlds; making possible worlds not even possible (absolute identity between worlds means that it is the same world), and the physical worlds an eternal recurrence. But this is not the case. For if all the attributes are necessary and essential then 'existing in world x' is also a necessary and essential attribute, and that means that the object in question cannot exist in any of the worlds successive to world x<sup>160</sup>. Hence, the identity between the successive worlds cannot be an absolute identity. I suggest, then, that the identity in question is an identity of types (sorts), but not of tokens (instances). By this I mean that the universals of this here world would be realised in the multiple ones as well, but not the specifics. For instance: My three-pawed dog has, according to this schema of the ancients, three paws as a metaphysical necessary attribute. In any possible world it would not be my

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<sup>160</sup> Another strategy for avoiding absolute identity between worlds would be to ascribe to any object the metaphysically necessary attribute 'existing at time #', but here we quickly run into difficulties in relation to sustaining identity as the object passes through time, within the world in which the object presently exist.

dog if it had more (or less) than three paws. In the physical successive worlds of Anaximander, however, the dog in question would still be a dog of the same kind, but it would not have all of the same characteristics; it would lack those not essential to the type, e.g. the three-pawness.

If there is non-token identity, why, then, would there be type-identity or any identity at all? Why would not the successive worlds be different entirely? The answer is in the necessary attributes and in the Unlimited as first cause of all the worlds. The Unlimited acts according to its essential attributes and abilities and is metaphysically barred from acting otherwise. The Unlimited causes the generation of the worlds, a generation defined by Anaximander in his cosmogony, the internal order of the *kosmoi* defined in his cosmology. These are not merely the description of this present actual world, they are the metaphysically unalterable workings of that which exists; reality. Hence the Unlimited must separate off the *gonimon*, and the *gonimon* must create fire and mist, and these opposed bodies must generate the world and the heavenly bodies. The major traits, or types, of the *kosmoi* must remain throughout time; the particulars, the tokens, must be subjects of change.

#### **4: Conclusion**

In this essay I have argued that Anaximander traditionally is causal-genealogically situated somewhere between pre-scientific mythical explanations, where humans and nature were contrasted to the transcendent causal powers of the gods, and the sophisticated ancient theories on generalized, abstract, ‘neutral’ causation, and that he is placed far closer to the former than the latter. This I argue should be somewhat adjusted, as there seems to be a systematic oversight in the historians of the causal-concepts; the fact that Anaximander applied the predecessor of the Principle of Sufficient Reason does not fit well into the ‘standard’ investigation of how this notion came to be. It seems that few, if any, of the historians of the concept of causality really emphasises or at all shows consideration to this principle being (silently) used in Anaximander.

There are indeed thoughts occurring in Anaximander that we can recognize in modern vocabulary and conceptualization; features of reality that we later will come to subsume under the concept of ‘causality’.

The notion of successive multiple worlds I have suggested reads as evidence of metaphysical necessity in causation, and that the multiple worlds are worlds of metaphysical type-identity.

The equilibrium of the earth by the Principle of Sufficient Reason I have interpreted as an implicit statement to the effect that all physical phenomena have physical causes, thus making Anaximander the *de facto* inventor of this notion.

Further I have argued that Anaximander cannot be an indeterminist as he believes that all events (or objects) have causes, also that these causes should be explicable as (parts of) explanations.

I have also argued that to Anaximander the world is governed by blind deterministic mechanism, without any final cause or cosmic supernatural principles, and that the physical laws of nature are sufficient.

Finally, that to Anaximander causation (though not expressed as such) must be essential and primary in the objects of the world.

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